



CAI

TI 814

- 78 N55


**A REPORT BY
THE SECTOR TASK FORCE ON**

THE CANADIAN NON-FERROUS METALS INDUSTRY

Chairman Alfred Powis

CAI
TI 814
-78 N55

REPORT OF THE
CONSULTATIVE TASK FORCE
ON
NON-FERROUS METALS INDUSTRY
JUNE 29, 1978



Digitized by the Internet Archive
in 2023 with funding from
University of Toronto

<https://archive.org/details/31761119693356>

July 20, 1978

The Honourable Jack Horner
Minister of Industry, Trade and Commerce
Department of Industry, Trade and Commerce
240 Sparks Street
Ottawa, Ontario
K1A 0H5

Dear Mr. Horner:

It is a privilege to transmit the attached report of the Consultative Task Force on the Non-Ferrous Metals Industry and, at the same time, to pay tribute to the dedicated and constructive work of the membership. However, a word of explanation is in order.

In the course of our deliberations, we were given to understand that the labour representative on our task force did not intend to submit a minority report but might wish to add certain specific comments. As a result, the report as drafted was a compromise which attempted to express his views as well as those of the other task force members.

The report was completed as requested by June 30, but without the benefit of the final comments of the labour representative despite repeated efforts to obtain them. The letter (attached as Appendix VIII) in which he disassociates himself from the report was finally received on July 20, by which time it was too late for significant changes.

Since it is a compromise, the tone and content of this report in certain areas are not what they would have been had we been aware of the labour representative's intentions.

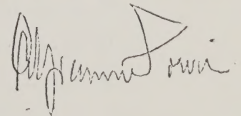
The labour representative's reasons for disassociating himself from this report are not specifically stated and are therefore impossible to refute in detail. The only reason given is that "the main focus is on proposals for special tax and other concessions to the industries which in my view are not justified by the objective circumstances". All that can be said is that:

- (1) This view was not expressed during our deliberations, although there was ample opportunity.
- (2) This view is difficult to reconcile with his statement about "the urgent need to resolve federal-provincial tax wrangles over the taxation of mining companies so that a dependable and stable tax environment is established".

During our deliberations, we obviously did not have the benefit of access to "The Labour Report to the Coordinating Committee for the Twenty-Three Industry Sector Task Forces" prepared by the Canadian Labour Congress and dated July, 1978. Thus, we had no opportunity to discuss its premises and recommendations. Suffice it to say that many of the diagnoses and prescriptions in this report are completely at odds with the views of most members of this task force. However, the short time frame within which the Coordinating Committee is expected to operate will preclude the detailed and decisive rebuttal to which this report should be subjected.

The effect of the tactics employed by the Canadian Labour Congress is to by-pass and thus sabotage the work of the various sector task forces. Canada's serious economic problems can be mitigated by meaningful consultation, if conducted in an atmosphere of mutual respect and trust. The reports of the 23 sector task forces are the product of a great deal of hard and effective work on the part of both public and private sector representatives, reflecting a sincere desire to achieve concrete and constructive results. The tactics employed by the Canadian Labour Congress are therefore a source of profound disappointment.

Respectfully submitted,



Chairman,
Consultative Task Force on the
Non-Ferrous Metals Industry

C O N T E N T S

	<u>Page</u>
INTRODUCTION	1
SUMMARY OF RECOMMENDATIONS	1
IMPACT	2
INDUSTRY PROFILE SUMMARY	3
TASK FORCE ASSUMPTIONS	4
MAJOR ISSUES AND RECOMMENDATIONS	5
I. INVESTMENT CLIMATE	
A. New Investment Opportunities and Costs	5
B. Corporate Liquidity and New Equity Capital	6
C. Government Operations	6
II. FURTHER PROCESSING	
A. Concentrates to Primary Metal	8
B. Primary Metal to Semifabricated Products	8
C. Transportation Costs	9
D. Trade Policy and Tariffs	9
III. SCIENTIFIC AND TECHNICAL	
A. Environmental Protection	11
B. Research and Development	11
IV. MANPOWER AND LABOUR	
A. Work Force Stability and Retention	13
B. Production Costs, Work Stoppages and International Competitiveness	13

A P P E N D I C E S

I - List of Participants	15
II - List of Submissions from Task Force Members	17
III - Sector Profile	
IV - Industry Mineral Tax Recommendations (M.A.C.)	19
V - Canada's Share of World Markets to Year 2000	21
VI - Environmental Issues	22
VII - Proposal to Improve the Canadian Climate for Research and Development	23
VIII - Comments by E.G. Docquier, President of United Steelworkers of America	26

REPORT OF THE
CONSULTATIVE TASK FORCE

ON

NON-FERROUS METALS INDUSTRY

INTRODUCTION

The objective of this task force report is to provide a basis for formulation of public policies which permit the optimal future development of an internationally competitive non-ferrous metals industry in Canada. With appropriate public policies, this industry has historically made a very major contribution to the growth of the economy. In recent years however, under less appropriate policies, its role has diminished. Revitalization of the industry is now imperative in order to provide the new production facilities necessary to retain Canada's important share of world markets. If its potential is fully realized, the industry will create additional employment opportunities, both directly and in ancillary sectors, and assist in the achievement of desirable social goals for Canadians.

The task force was formed under the auspices of the Department of Industry, Trade and Commerce as a result of the First Ministers Conference in February, 1978. It is one of 23 such industry groups whose advice is being sought in an innovative national exercise in government - private sector consultation. It included representation from both large and small firms in the industry (both metal producers and fabricators) from labour, the academic community and advisers to provincial governments. Members represent all regions of the country. A list of participants is attached as Appendix I. The process involved a series of meetings, correspondence and preparation of specialized background papers by task force members. A listing of all such papers impacting on the discussions is attached as Appendix II. Copies are available.

It became clear in the discussions of the task force that there is an urgent need for decisive action and bold policies to cope with the problems we are facing. This is true not only for the non-ferrous metals industry but also for most industry in this country, as all ultimately face the "bottom-line" of international competition.

In particular, task force members are concerned about the alarming decline in the level of exploration for new non-ferrous metal mines in Canada. Unless measures are taken by all concerned to revive exploration in this country, there will be a spectacular decline in production in this sector over the balance of this century.

To date, inadequate measures to deal with critical issues such as declining research and development, taxation of illusory profits or the chaotic mining tax situation have discouraged much of the basic primary and manufacturing industry in this country. Task force members unanimously supported the current concept and exercise of consultation and participation, but they also felt that it is vitally important that some concrete, positive and meaningful results ensue. Accordingly, we suggest that each task force meet again a year hence with government to assess progress on the issues outlined in these reports and to discuss further initiatives.

SUMMARY OF RECOMMENDATIONS

There were several major areas where issues of common concern to the task force members were identified. Each was examined by a special subcommittee and recommendations, concurred in by the full task force, were made to improve the future performance of the industry. These may be summarized under four headings.

I. Investment Climate

The issue of overriding importance to the non-ferrous metals sector is capital formation: the requisite creation of conditions which will permit the industry to overcome its liquidity problems and to encourage the channelling of savings into productive equity (risk) investment. The financial condition of the mining sector in particular has deteriorated as a result of curtailed cash flow and the impact of inflation. Recommendations include more stable and better co-ordinated government policies; more rational and equitable tax structure; through early resolution of the Federal-Provincial dispute over mining taxation, and the optional use of LIFO inventory valuation to prevent taxation of illusory profits. Recognition and encouragement of the role of

equity capital investment is a critical aspect of this issue and recommendations are made for changes to the capital gains tax such as tax deferral on reinvestment and inflation indexing of cost base. Such a policy adjustment would not only be equitable in terms of the impact of inflation on individual savings, but could act as an important signal to potential investors that profit-making from assuming risk was perceived as a socially useful and desirable activity from which individual rewards could be retained.

2. Resource Processing, Transportation and Trade

When the present worldwide surplus of smelting and refining capacity is absorbed, there is potential in the longer term for processing of increased Canadian non-ferrous mine production up to the metal stage. Short and long-term comparative economics (including proximity to customers) will determine actual locations and prior stages of production cannot be expected to subsidize subsequent stages. It was recognized that production costs in the Canadian semifabricating sector are generally higher than in the United States, and that this sector of the industry is vulnerable to reductions in the Canadian tariff and to upward movement in the exchange rate. Recommendations to improve the Canadian position include competitive and equitable transportation charges, realistic competition legislation, reasonable tariff protection at least in the near to medium term for semifabricated products, and research and development on technological improvements at the mine through metal processing stage.

3. Environment, Research and Development

In this area particularly, government and industry need to understand each other and to learn to work together. The necessary degree of protection to the natural environment must be provided without impairing the economic health and growth of the non-ferrous metals industry. Recommendations include federal-provincial co-operation in the setting and enforcement of standards, and greater attention to site-specific requirements and Social Economic Impact Assessment (SEIA). R&D expenditures in Canada are proportionately lower than in other countries and are more concentrated in areas of pure research rather than in applications of technology to commercial development. Recommendations underscore the basic premise that incentives must be of a stable and long-term nature in order to be meaningful. Research teams of a "critical size" must be maintained over many years to be truly effective. More "contracting out" by government would be of value, and longer-term research policies should focus on the development of commercial products and processes.

4. Manpower and Labour

Some of the issues raised in this important area concerned the ability of the industry to compete successfully in world markets against minerals produced elsewhere. Others focussed chiefly on the matter of stability of the work force and communities, on mobility factors and on labour retention particularly in more remote locations. Concern was expressed regarding disruptions of the total supply chain in mineral products due to labour-management disputes, and the resulting implications for Canada's reputation for reliability in world markets. At the same time, labour's legitimate compensation needs must be recognized, in a manner which does not price Canadian mineral products out of world markets. Recommendations include the need on the part of governments to accept greater responsibility in their own pace-setting labour relations, and special tax incentives for workers staying in high cost isolated locations. Consideration is also recommended in the area of labour mobility for training and certification policies, portability of pensions and for special transportation and work scheduling arrangements for ferrying workers to remote work sites from established communities.

IMPACT

Recommendations in this report are focussed in two general areas:

1. Measures to alleviate some of the existing excesses of costs and taxation that have overtaken the industry during the past decade, so that the private sector can once again look forward to rates of return on development that are reasonable in relation to the risks involved.
2. Measures to alleviate the squeeze on corporate liquidity and real retained earnings that has resulted from the combination of inflation and unsatisfactory earnings levels, so that the industry will have the financial strength to undertake new projects as opportunities arise.

Through to the prime metal stage at least, this industry is internationally competitive, with a level of technology and expertise that are respected and sought after throughout the world. Given supportive public policies which permit the industry to maintain its present share of world markets, over the balance of this century it can:

1. Contribute to economic growth by adding \$12 billion (in 1977 dollars) directly to the gross national product over and above its present contribution.
2. Contribute to the solution of our unemployment problems by adding directly 150,000 new jobs, largely outside our large urban centres in areas of the country which need them the most. A considerably larger number of new jobs will be added indirectly, related to the industry's substantial purchases of goods and services for operating purposes as well as the large capital expenditures that will be required.
3. Contribute to the solution to Canada's future balance of payments problems, by adding \$8 billion (in 1977 dollars) to our exports.

Unless corrective measures are taken, however, the industry will shrink dramatically in size over the balance of this century.

INDUSTRY PROFILE SUMMARY

An analysis of the industry, condensed in the form of a sector profile, was provided by the staff of ITC as a starting point for analysis and discussion. The task force members accepted the profile for this purpose, while not necessarily endorsing all conclusions or views expressed. A copy is attached as Appendix III.

This sector was defined along vertical lines from raw mine resource to finished products, but in fact it is less homogeneous than might have been expected. It divides naturally into two parts: a primary sector involving mining and metal production, and a secondary sector involving fabricators and metal users. The fundamental characteristics of these sectors differ profoundly. For example, the primary sector is more capital intensive and may give rise to environmental problems, characteristics which generally are less applicable to the secondary sector. It should be noted that this sector, as defined, does not include all of the mining industry, but only that part which mines and processes non-ferrous metals. Although there is significant foreign ownership, the firms involved are predominantly Canadian owned and controlled and overwhelmingly Canadian managed.

The five major non-ferrous metals produced in Canada are aluminum, copper, lead, nickel and zinc. Other metals produced include molybdenum, gold, silver, tungsten and tantalum. The industry is based on domestic ores except for aluminum. About one-half of copper, lead and zinc mined is exported in concentrate form, and one-half is smelted and refined in Canada into primary metal. Some two-thirds of the primary aluminum, copper, lead and zinc metal produced is exported, and one-third is used in Canadian secondary manufacturing. Over 90% of the nickel produced in Canada is exported.

Aluminum and copper are further semifabricated into bars, sheets, tubes, etc. and used for electrical, transportation, building construction and other purposes. The other metals are not used on their own to the same extent. Nickel is used for the production of stainless steels, high nickel alloys and electroplating; zinc is used for galvanizing of steel and die castings; batteries account for over one-half of the lead consumed.

More than 70 per cent of total production is sold in foreign markets. In 1977, these exports were valued at \$3.1 billion and accounted for 7.2 per cent of total Canadian exports, a decline from \$3.7 billion and 9.9 per cent in 1976. Concentrates of all metals plus certain unrefined metal products account for approximately 40 per cent, and metal accounts for about 60 per cent of the total value of concentrate and metal exports. Semifabricated products are sold mainly in domestic markets with export sales being valued at \$147 million in 1977.

The Canadian non-ferrous metals industry employs directly approximately 100,000 people - 52 per cent in mining, 35 per cent smelting and refining, and 13 per cent in semifabricating. Indirect employment is several times the number directly employed. Fabrication of aluminum products, etc., represents additional value added and employment not available from present sector statistical compilation. With this exception, the following table shows the distribution of the industry in Canada.

	<u>Atlantic</u>	<u>Quebec</u>	<u>Ontario</u>	<u>Prairies</u>	<u>B.C. and Territories</u>	<u>Total</u>
<u>Employment (000)</u>						
Mining	3	7	25	7	10	52
Smelting/Refining	1	17	10	2	6	36
Semifabrication	<u>n/a</u>	<u>5</u>	<u>9</u>	<u>n/a</u>	<u>1</u>	<u>15</u>
	<u>4</u>	<u>29</u>	<u>44</u>	<u>9</u>	<u>17</u>	<u>103</u>
<u>Establishments (#)</u>						
Mining	18	36	55	24	43	178
Smelting/Refining	1	9	9 *	5	4	28
Semifabrication	<u>n/a</u>	<u>12</u>	<u>14</u>	<u>3</u>	<u>3</u>	<u>32</u>
	<u>19</u>	<u>59</u>	<u>78</u>	<u>32</u>	<u>50</u>	<u>238</u>

* Including Texasgulf under construction

TASK FORCE ASSUMPTIONS

1. Longer-term economic growth will continue but at a rate below that experienced since the end of World War II. While the rate of growth has been below potential in recent years, it is not expected that the industrial economies of the world will enter a depression as severe as the one which occurred in the 1930's, but business cycle fluctuations will continue.
2. The task force heard the presentation of the medium-term target projections of the Department of Finance and, while accepting them as targets for performance, was doubtful that they would be attained in the time frame considered. Consequently, the task force assumed more conservative rates of change - lower for real growth and somewhat higher for inflation.
3. Economic growth at the reduced rate will by and large only slowly eliminate the present surpluses of commodities such as copper, nickel, and zinc. It is expected that some prices will rise to more economic levels. However, levels of demand and prices that would provide a return on investment sufficient to encourage new capacity will probably not be seen on a sustainable basis until the mid-1980's.
4. The task force assumed improvement in some elements of Canada's competitive position internationally - the rate of wage increase will be no greater than that in the United States, and the value of the Canadian dollar will remain lower than the U.S. dollar. There is, however, no indication that productivity in Canada will increase more rapidly than in other industrial trading nations. Tariff reductions averaging 40 per cent will be implemented over a period of eight years from 1980 as a result of the M.T.N.
5. Government policy, as outlined in the background papers and other white papers, will be supportive of private industry and will focus on the importance of private enterprise in generation of the real wealth of the country. Expansion of the public sector and growth in government spending in real terms will be held below the growth rate of the economy in recognition of the need to reduce the overall size of the government sector in the economy to make room for a vigorous private sector.

MAJOR ISSUES AND RECOMMENDATIONS

I INVESTMENT CLIMATE

Obviously, new investment is the key to continued development of all sectors of the Canadian economy. There are two prerequisites:

- opportunities to invest in new projects where the prospective rate of return justifies the perceived risk; and
- sufficient financial capacity to support the required investment.

A. New Investment Opportunities and Costs

A reasonable prospective rate of return depends on markets and prices on the one hand, and the cost structure (both capital and operating) on the other. Even where the prospective rate of return is adequate, other constraints may impede investors.

Because such an overwhelming portion of this sector's production is sold on world markets, there is little that Canadians can do to influence demand and prices, particularly where significant overcapacity exists. Thus costs (including taxes) and other constraints are the main variables we have to work with. Most of the recommendations in other sections of this report bear on these costs and constraints but at this point, dealing with matters which impact directly on investment, we would make the following recommendations.

1. The background papers supplied to the various task forces correctly identify Canada's uncompetitive cost structure as a major problem. The recent decline of the value of the Canadian dollar, painful though it may be in terms of our pride and living standards, does correct this problem to some extent. In fact, for many companies devaluation provides the margin of survival. We recommend that the government accept the verdict of the exchange markets and that artificial means not be used to increase the value of the Canadian dollar.
2. The fact that the costs of new construction are higher in Canada than elsewhere is a serious barrier to new investment. This may be partly inevitable due to our climate, but should be mitigated to the extent possible. We therefore recommend removal of all sales taxes (federal and provincial) on all materials and equipment forming part of new production facilities.
3. Except for the mining sector, we do not consider that nominal corporate tax rates in Canada are excessive. We do believe, however, that only real earnings should be taxed, and make specific recommendations in this regard in this section of the report.
4. The taxation of mining income across Canada is chaotic and perverse. It has resulted in a situation in which development of all but the richest discoveries would be uneconomic even when demand and prices improve. As a result, exploration activity in this sector is far below the levels needed to sustain present production, let alone provide for growth. We, therefore, strongly support the recommendations of the Mining Association of Canada in this regard, attached as Appendix IV, and recommend that this issue be addressed by the federal and provincial governments as a matter of extreme urgency.

Present sluggish demand for minerals, and the prospect of slower growth in future, have led some people to question whether markets will be available for the output of new Canadian mines. This concern is exacerbated by the growth of government involvement in mining in developing countries, raising questions regarding the ability of Canada to compete with such enterprises which may respond to considerations other than those related to profit and normal commercial concerns. On this latter point, it is important to note that Canadian mines and metallurgical plants are internationally competitive, despite lower grades, due to the high level of technology employed and the productivity of our work force.

It is also important to recognize that ore deposits, by their nature, eventually become exhausted. By the year 2000, production of most metals from currently known deposits in Canada will be less than a third of today's levels. Clearly, vigorous exploration and development will be needed just to stay even.

Even assuming much slower growth in the future, Canada must find and develop new non-ferrous metal mines by the year 2000 with a capacity to produce more than our present total output if we

are simply to maintain our existing share of world markets. This is shown in Appendix V. Obviously a high and sustained level of mineral exploration effort is essential to the continued long-term existence of much of this sector. Unless measures are taken to revive exploration in Canada, the rest of the recommendations in this report will be largely irrelevant, since much of the industry will have no future.

B. Corporate Liquidity and New Equity Capital

Even if the opportunity to earn a reasonable rate of return exists, the private sector requires financial capacity if the project is to proceed. In this regard, the inadequate liquidity of much of the Canadian industry is a serious obstacle to the achievement of our economic objectives. The causes are well known - the impact of inflation, inadequate profits, and the increasing reluctance of Canadians to invest in the risk (i.e. common equity) securities of the corporate sector. The recommendations which follow are intended to improve corporate cash flows through mitigating the impact of inflation, and to create a climate in which Canadians will be encouraged to invest in common equities:

1. We recommend that only real earnings be taxed, and that corporations be permitted the optional use of LIFO inventory accounting instead of the present inventory tax credit. This method of calculating taxable (and reported) income is available to firms in our major competitor country the U.S., and a comparable benefit is available in the U.K. through an adaptation involving a special inventory increase deduction. The lack of this in Canada is considered a competitive disadvantage not only for metal producers but more particularly for fabricators and secondary manufacturers. The only plausible argument that has been advanced to us against the proposal is that it would reduce government revenue in the short term. According to the Economic Council of Canada, taxation of inventory gains has been running at the rate of more than \$1 billion per year, only 30 per cent of which is offset by the inventory tax credit. Governments must recognize that it is unreasonable to expect the private sector to provide the economic growth Canada requires while its financial strength is being drained by taxation of capital through overstatement of real profit. In any event, if the government inflation targets are met, the cost in terms of tax revenues will not be large. To argue that government cannot afford the revenue loss resulting from use of LIFO is also to argue that government cannot afford to meet its own inflation targets.
2. For the same reasons, we recommend indexing of fixed assets for capital cost allowance purposes. (According to the Economic Council's studies, the revenue impact of this proposal would not be profound.) Strong reservation on this point by one task force member must be recorded here. He felt that any indexing method could lead to passive acceptance of inflation and preferred a recommendation that governments seek policies to reduce and limit the debilitating impact of this factor.
3. Changes in government policy and national attitudes towards profits are badly needed to create the necessary climate of confidence. The earning of profits commensurate with the risks involved must be - and must be seen to be - a socially desirable objective. We recommend that government take the lead in creating a climate in which successful investment is applauded, not condemned.
4. While it is not an important source of government revenues, the new capital gains tax structure is a serious impediment in terms of the perception of risk investment by Canadians. As long as inflation persists, it will remain a tax on capital and not on real gains. Collective saving, through private pension and other plans, is not taxed on realization of either income or gain, until the funds are withdrawn for consumption purposes. This reduces the general tax bias against saving and aids capital formation. The same treatment ought to be available to individuals for private saving through equity investment. If the recommendations of the Bryce Commission are politically unacceptable, we recommend that: (a) indexing of the capital cost base be permitted; and (b) tax-free roll-overs (i.e. deferral of tax by reinvestment) be allowed for all investors, not only for owner-operated businesses and firms. Canadian content rules could accompany such adjustments.

C. Government Operations

In today's complex world there is a natural yet regrettable tendency for both individuals and institutions to approach various problems, issues and policies in isolation. Inadequate attention is paid to critically important inter-relationships and trade-offs between objectives which, while desirable, are frequently not easily reconcilable. This gives rise to conflicting policies and priorities between various levels of government, and between various departments of the same

governments, with results which can seriously and increasingly impede new investment. Harmonization of policies within the public sector is essential if Canada is to achieve its economic objectives. If government policy is to be "fully supportive of employment and efficiency objectives", a number of recent government initiatives are clearly inappropriate. The following recommendations are intended to be illustrative rather than all inclusive.

1. The task force agrees that new legislation governing competition would be desirable, but believes that the most recent draft (in common with its predecessors) is completely at odds with employment and efficiency objectives. It does not come to grips with the original intent of the Economic Council in recommending revisions to the Combines Act. The proposed Competition Act generally ignores the reasonable recommendations made in the Skeoch-Macdonald report, and the general thrust is at variance with the findings of the Bryce Commission. It concentrates on an apparent lack of competition within an industry producing products from a common material and ignores the real competition that exists between industry sectors producing products with a common use from differing materials. It would promote industrial fragmentation and remove control of economic policy from politically accountable government departments and agencies. Unless new competition legislation can be harmonized with the government's economic policies and the needs of the Canadian economy in the 1980's, the task force supports the recommendation of the Cement and Concrete Industry that it be abandoned. The present law at least has the virtue of familiarity.

2. The task force agrees that, wherever possible, industrial development should not unduly degrade the natural environment or cause harm to indigenous wild life. On the other hand, industrial activity, wherever it occurs, is bound to have some environmental impact, and a proper balance must be struck between the needs of people, new employment opportunities and the desire to preserve an unspoiled environment. Recent proposed land use regulations (e.g. Baker Lake, N.W.T.) tend to ignore these very real trade-offs. The task force recommends that, in establishing priorities, economic objectives be given full consideration, except where severe and irreparable damage to the local environment or wild life would clearly result.

3. Industry is increasingly concerned about the high cost of satisfying the demands of government for information and compliance. The task force recommends a reduction of the paperwork and other responsive burdens imposed by government on industry. Co-operative ventures, such as the present consultative exercises, can be among the more useful forms of contact, providing that a real two-way communication flow results.

II FURTHER PROCESSING

A. Concentrates to Primary Metal

In the longer term, Canada may have considerable potential for further processing of concentrates to primary metal. Development of this potential will depend on several factors: increased mine output; the worldwide need for additional smelting and refining capacity, an efficient internal transportation system, and commercial application of improved processes. Due to the capital intensive nature of this sector, and the effects of inflation, new facilities generally cannot compete with those built in the 1960's. At present, a worldwide surplus of smelting and refining capacity exists for most metals, and opportunity will not arise until this is absorbed - probably no sooner than the mid-1980's.

Nor will opportunity for further processing arise except in the context of growing mining production. A strong revival in exploration is urgently needed just to maintain present levels of output over the next two decades. Unless present trends are reversed, we will soon have trouble supplying existing smelting and refining capacity, let alone considering new facilities.

Facilities will be constructed in Canada when the projected return on investment is equal to or higher than the return available on similar facilities elsewhere. Long-term commercial relationships must also be considered, to ensure that domestic resource upgrading policies are compatible with the interests of present and future customers for raw materials. By changing the "package" of the product, markets and distribution channels may also require adjustment.

To ensure that advantage can be taken of the opportunities that may arise when the present worldwide surplus capacity is absorbed:

1. Canada should continue to seek elimination or significant reductions of foreign tariffs and quotas on all non-ferrous metal products up to and including at least the primary metal stage.
2. The Government of Canada should not assist the construction of resource processing facilities in other countries to produce commodities produced in Canada and traded in the international market, without providing at least equivalent assistance to domestic industry.
3. Research on improvement of processes by private industry should be encouraged to take advantage of future opportunities in Canada for further processing as well as to provide requisite adjustments to higher energy prices and a changing international environment.

B. Further Processing - Primary Metal to Semifabricated Products

There is less scope for additional further processing beyond the metal stage for Canadian mine products than popular mythology would have us believe. This activity already takes place in Canada, with the industries involved generally having enough capacity to supply the domestic market and do some exporting as well. A dramatic increase in fabricating activity clearly depends on expanded exports, and there are few examples in the world of successful export-oriented manufacturing industries that are not founded on a strong domestic base. The fragmented nature of the Canadian market is an impediment in this regard.

While new opportunities may exist, they appear to be largely limited to aluminum and copper. However, world trade in semifabricated aluminum and copper articles is expected to remain a relatively small percentage of total world consumption. The higher cost of shipping semifabricated products constitutes a significant barrier to export trade. To maximize any possibilities that may exist for increased semifabrication, the task force suggests that:

1. The auto pact continue to be an important facet in the development of semifabrication based on the total North American market. In view of the present trade deficit in auto parts, the government should be encouraged to continue its worthwhile efforts to increase parts manufacturing in Canada.
2. The present duty drawback procedure is too complex and should be simplified to facilitate development of import-export opportunities for Canada. The government should hasten the proposed inward processing order, which would permit the importation free of duties and taxes of materials to be used in the manufacture of goods destined for export.

3. DREE assistance as a development incentive particularly for fabrication and manufacturing should be maintained where regional disadvantages, long development lead times, or initial start-up risks may require some back-up for private capital. Investors should be given the alternative of some form of tax exemption in place of direct subsidy. This would be a more motivating incentive and a less costly one to administer, yet it can still vary for different parts of Canada according to regional economic development needs. As a policy matter as much value should be placed on the preservation of existing jobs as on the creation of new ones.

4. Any reduction or removal of Canadian tariffs on semifabricated non-ferrous metal products should be proceeded with selectively and over an extended period of time in order to provide opportunity for the industry to adjust properly to import competition from lower cost countries. Accurate commodity classification on customs documentation is essential to the preparation of accurate import statistics for proper monitoring and decision making.

5. Provincial government initiatives to restrict products made of non-ferrous metals for reasons other than health or safety, clearly inhibit this sector. Restrictions and taxes on beverage cans are an example. A positive policy of levying high returnable charges to prevent littering would be preferable to outright prohibition in that the market is permitted to make the necessary adjustments.

C. Transportation Costs

Transportation is a major cost in the non-ferrous metals industry at all stages, and competitive rates throughout the delivery system are essential to enhance the future growth of the industry. The task force supports the principle that costs should be recovered through the freight rate structure. However to the extent that the rail system is forced to carry certain commodities (e.g. grains) at unremunerative rates, an added cost burden is imposed on the rest of industry. This is particularly onerous for the mining and metallurgical industry, which accounts for more than half of all rail freight movements in Canada. Where domestic smelting and refining facilities are located at some distance from mines, uncompetitive freight rates should not cause them to operate with surplus capacity while concentrate is shipped offshore for processing.

The recommendations are:

1. The non-ferrous metals industry should pay rail freight rates in keeping with transportation costs of its products, and should not be expected to assist in subsidizing other industries' transportation costs. Sector assistance, notably for grain products, should be drawn from general government revenues if public policy requires that subsidies be paid.

2. Rail movement is the most efficient means of handling bulk products. In remote areas, it should not be necessary to build in the additional infrastructure costs of an alternative mode of transportation, such as construction or upgrading of roads and highways, in order to obtain competitive rail rates.

3. Possibilities for large size plants for the manufacture of semifabricated products at more remote locations in Canada which have advantages of materials availability, are limited because rail freight rates to the central North American markets are higher than for equivalent distances in the United States. Initiative should be taken to encourage more widespread industrial development by establishment of more uniform freight rates regardless of the nature of the commodities transported. Initially subsidized developmental freight rates should be established which would provide a reasonable return to the carrier as local semifabricating industry develops and volume increases.

D. Trade Policy and Tariffs

Canada's non-ferrous metals industry is heavily export oriented for primary products and import competitive in its domestic markets for fabricated products. Quotas, export subsidies and non-tariff barriers are an impediment to the industry's growth where they distort normal trade patterns.

1. Foreign export and other subsidies are detrimental, and Canada should seek their elimination. More uniform application, in conformity with GATT rules, of countervailing duty and anti-dumping sanctions is important to continuing international competitiveness of the industry.

2. Although Canada should seek reciprocal removal of tariffs and quotas up to the primary metal stage, caution is recommended in reduction of tariffs on semifabricated products, wire and cable. Complete elimination of tariffs on these products would have a perverse impact and cause a decline in investment and employment in this segment of the industry in Canada.

3. International commodity arrangements for price stabilization and market allocation hold no practical advantages for the Canadian industry. Canada would be under extreme pressure to bear a disproportionate share of production curtailments during periods of oversupply. The task force recommends that participation in any international group be solely for purposes of collection, dissemination and improvement of statistical data on the industry.

III SCIENTIFIC AND TECHNICAL

A. Environmental Protection

The task force considered this area of sufficient economic importance and technical complexity that the full report of the subcommittee is attached as Appendix VI. A summary follows here.

Broadly stated the essential issue is the need to provide protection to the natural environment without impairing the economic health and growth of the non-ferrous metals industry.

The past decade has witnessed a growing concern for the physical environment; the resulting laws and regulations were narrowly focused on the physical environment, required rather extreme measures, and were to be administered by specialists in the physical environment. However, the cost of compliance with maximum technical standards for the non-ferrous metals industry is so large that the overall economic effects of these laws and regulations far transcend the original concern for the physical environment. Yet there is no mechanism for balancing such often conflicting interests as employment, occupational health, regional development, the physical environment, ability to compete in world markets, balance of payments and public health.

Some regulators have recognized the complex dilemma, but the only discretion allowed them is to decide whether or not to enforce the regulations. As environmental changes become less severe, a realistic balance of affected interests should be made. Divided jurisdiction increases the difficulty and cost of compliance as provincial and federal authorities both operate broadly but with different timing and with different quantitative standards of performance.

Recommendations are that the existing framework of laws and regulations should be revised or replaced by the following:

1. The federal authorities, in co-operation with the provinces, should set minimum standards for environmental quality to be enforced by the provinces. These standards would be used only for ruling out the grossest kinds of environmental abuse.
2. The federal authorities should take the lead in research into environmental matters in co-operation with industry and the provinces. This would include developing improved analytical techniques, control technology and, most important, methods for assessing actual risks to people and the environment. Such an effort would be multidisciplinary.
3. The federal and provincial authorities should jointly establish a mechanism for evaluating and comparing costs and benefits resulting from activities of the non-ferrous metals industry. The provinces would conduct the evaluation and, based on the results, give specific directions to the company or industry involved. The Social Economic Impact Assessment (SEIA) approach currently being experimented with by the federal government is a recognition that the side effects of regulatory actions must also be evaluated. The task force approves this approach, but suggests that SEIA is being applied to broad regulations whereas situations in the non-ferrous metals industry require site-specific evaluations and environmental regulations that provide opportunity for an important input from the people most directly affected. This should be mainly a provincial responsibility.
4. It is most important that federal and provincial governments co-operate in directly reducing the number of agencies, or at least co-ordinating and reducing the amount of bureaucratic overlap, which industry now faces in the process of obtaining environmental approval for new projects. An appreciation of the cost of unnecessary delay time in a project development schedule is felt to be an essential element in government-industry co-operative involvement. Accountability should be focused in one overall project - responsible department and a time frame should be specified in the law or regulation.

B. Research and Development

Canada's overall research and development (R&D) expenditures have declined relative to constant dollar GNP for the past decade. By this measure, the country now ranks only 14th among OECD nations, just ahead of Greece and Turkey. Moreover, industry's share of R&D activity relative to that of government is significantly lower in Canada than in most other industrialized countries. This condition is of such widespread concern and importance that the task force is including its full subcommittee report as Appendix VII. A summary of this report and recommendations follows here.

The Canadian mining industry has maintained a high R&D performance relative to other industries, but even here the situation has deteriorated over the 1970's. Much of our present R&D dilemma is related to a basic structural problem, rather than simply to cyclical factors. Canada has traditionally focused on pure research, relative to other nations, whereas commercial development and the application of new technology have constituted the leading edge to progress in recent years. To meet Canada's future needs, we must develop a strong and well-directed industrial R&D capability which is closely tied to production and marketing knowledge, opportunities and applications. There must also be sufficient numbers of qualified people in smaller Canadian businesses to recognize and take advantage of the opportunities provided by new developments.

The task force recommends an integrated package of tax and other policy incentives to achieve the above objectives. Long-range planning of effective industrial R&D requires that the following incentives, once implemented, be left unchanged for at least a decade:

1. The Government of Canada should expand wherever feasible the contracting out of research to many times its current level. This is important to aid in establishing levels of Canadian industrial R&D commensurate with those in other leading industrial nations as well as to maintain the capability of research teams where the industrial sponsor's financial capacity is temporarily diminished.
2. A basic and generous tax credit for industrial R&D capital and operating expenditures must be the keystone of any successful incentive program; it should include provisions for carrying forward unused credits and might include regional differentiation of credits allowed.
3. To assist in the effective use of new professional and technical R&D manpower, and to retain in Canada trained personnel, there should also be investment in intellectual capital. Three levels of federal "manpower" grants are suggested to allow: students in professional and highly skilled technical courses to be recruited to industrial R&D installations for a period of one or more years; Canadian graduate students to be hired for a period of up to three years; hiring of other qualified researchers or student summer help where this increases the existing R&D complement at a location. These grants will be particularly important to smaller businesses which might otherwise never have access to such facilities.

An appropriate federal-provincial government "mix" of the above proposals should be a matter for serious debate, but all elements appear essential to success. The conditions under which any R&D incentives are made available must recognize that the commercial exploitation of Canadian technology to the overall national benefit implies the potential for generating returns from the export of such technology, together with requisite consulting and other services, as well as from goods embodying the new technology.

IV MANPOWER AND LABOUR

A. Work Force Stability and Retention

Several aspects of labour and manpower were discussed and much of the thrust of the comments focused on the matter of stability; for the individuals and groups involved for the communities and for the industry. The question of labour mobility is also important in this regard. Issues in this category affect the ability of the industry to compete successfully in the world marketplace against mineral products produced elsewhere. Many of these are directly related to government policies and, while recognizing the difficulties of divided jurisdiction, the task force has the following recommendations.

1. A problem of increasing importance is labour retention, particularly at Canadian mining operations and more particularly at those remote from urban centres. There is often an excessively high turnover rate for a significant portion of the work force in these locations. In order to encourage the movement of people from highly concentrated urban areas in the South, where unemployment is high, to productive employment in the North, where development potential exists, the government should give serious attention to some form of personal income tax relief for employees in remote areas of Canada who remain on the job for a period of two years. A graduated scale for such a "Northern allowance" is recommended, varying with the degree of isolation and latitude, e.g. 40 per cent remission above 60th parallel, 60 per cent above Arctic Circle, 100 per cent above 70th parallel. (One suggestion was made that the incentive scale be graduated on the basis of temperature gradient, by isotherms rather than geographic parallels; another that the 30 per cent additional provincial tax proxy payment be eliminated for tax payers in the Yukon and N.W.T., which revenue loss would be small, by simply removing a single line in the personal tax form.)
2. In recognition of equity and for better manpower planning, the industry should have assurance from regulators that benefits to compensate for isolation and higher living costs in remote areas, such as subsidized meals, housing, fuel and transportation, will not be deemed to be taxable.
3. Government policy, in conjunction with industry and labour co-operation, should encourage the upgrading of skills, training and retraining of all personnel working in the industry. Government should facilitate the certification of completed training for individuals to encourage both stability and mobility of the work force in the industry.
4. There is much current debate in the area of fringe benefits on the question of pensions, in particular greater ease of portability. The task force noted that the question of more portable pensions has particular application to the circumstances of the non-ferrous metals industry.
5. Where new mines in remote locations may be accessible by special transportation, encouragement should be given to work scheduling and ferrying arrangements to allow the work force to continue living in an existing stable community and permit the better utilization of existing social infrastructure.
6. The government should continue to review the operation of its unemployment insurance program, particularly to eliminate possibility of systematic abuse of this system which is otherwise socially useful and meets needed objectives.

B. Production Costs, Work Stoppages and International Competitiveness

Canadian labour rates are among the highest in the world and are an important cost element for most mineral products. International competitiveness can be maintained providing Canadian productivity is correspondingly high and the rate of inflation is contained. The legitimate compensation needs of labour and the desire to maintain the purchasing power of workers must be recognized, but at the same time care must be taken not to price Canadian mineral products out of world markets. Careful research, including investigation of all factors such as "fringe" benefits, is needed in making international comparisons of wage and labour costs that may subsequently be translated into policy actions.

For a variety of reasons, there has been in recent years a high incidence of labour unrest and work stoppages in Canada at mines, in rail transportation and at ports. This has affected continuity in the whole mineral supply chain with the result that Canada's long-established reputation for reliability of supply has been eroded in recent years. Partly as a result of supply concerns, customers have reduced their dependence on Canada as a supply source by buying a larger proportion of their requirements elsewhere.

One important factor in this unfavourable sequence of events in recent years, has been government industrial relations policies, or lack of them, made in the absence of market discipline regarding a competitive cost structure. Some government wage and compensation decisions have established patterns which the private sector cannot afford. Governments are often afraid of alienating votes, and are not capable of adopting tough positions which are usually necessary in the bargaining process. These factors, coupled with broad leverage of public service unions such as the postal workers, have disrupted economic output and our competitive position in the world marketplace.

Another serious concern is the indexing of pensions with its severe cost implications for the private sector and for the whole country. Government pacesetting in the indexing of pensions has raised the expectations of employees in the private sector in an unrealistic manner and consequently complicated collective bargaining. Also of concern are initiatives of the Federal Minister of Labour such as the recent proposal to introduce a program to provide employee leave for education of a general and not necessarily work related nature, to be paid by employers, without there being some guarantee that the employee will continue working.

The task force recommends that the federal government give increasing recognition to the serious cost implications to business, and the damaging effect on the industrial competitiveness of Canada's industry, of its numerous pacesetting initiatives in labour matters.

CONSULTATIVE TASK FORCECANADIAN NON-FERROUS METALS INDUSTRYCHAIRMAN

Mr. A. Powis
Chairman and President
Noranda Mines Limited

MEMBERS

<u>Representative</u>	<u>Affiliation</u>
* Mr. H. Corrigan President	Alcan Canada Products Limited Toronto, Ontario
Mr. J.B. Campbell President and General Manager	Canadian Bronze Company Limited Welland, Ontario
Mr. H.T. Fargey Executive Vice-President	Cominco Limited Toronto, Ontario
Mr. S. Brown President	Doehler Canada Limited Guelph, Ontario
** Mr. D.R. Knowles Chief Engineer and Director	Doehler Canada Limited Guelph, Ontario
Mr. D.A. Thomas President	Federated Genco Limited Burlington, Ontario
** Mr. C.W. Pritchett Treasurer	Federated Genco Limited Burlington, Ontario
Mr. J. McCreedy Chairman and Chief Executive Officer	Inco Metals Company Toronto, Ontario
Mr. W.E. Stracey Chairman and Chief Executive Officer	Indal Limited Weston, Ontario
Mr. J.H. Lutley President	Johnson Matthey & Mallory Limited Toronto, Ontario
Mr. B. D'Aragon President	Pole-Lite Limited Saint Philippe Comté de Laprairie, Québec
Mr. A. Piché President	Reynolds Aluminum Company of Canada Limited Cap-de-la-Madeleine, Quebec
Mr. R.A. Farrant President	Sentinel Aluminum Products Co. Limited Don Mills, Ontario
Mr. I.G. Stott President	Stott Aluminum Corp. Ltd. Sydney, Nova Scotia
Mr. E.G. Docquier President	United Steelworkers of America Toronto, Ontario
Prof. H. Drechsler Faculty of Commerce	University of B.C. Vancouver, British Columbia

Provincial Representatives

British Columbia	Mr. Lorne Sivertson Director Ministry of Economic Development
Manitoba	Mr. Donald Elliott Director Department of Industry and Commerce
New Brunswick	Mr. Dallas Davis Chief Department of Natural Resources
Ontario	Mr. C.B. MacConnell Director Ministry of Industry and Tourism Mr. Murray Stewart Ministry of Industry and Tourism
Quebec	Mr. Rémi Kelly Assistant Director Ministry of Industry and Commerce Mr. Emile Beauchamp Industrial Counsellor Ministry of Industry and Commerce

Industry Observers

The Mining Association of Canada Ottawa, Ontario	Mr. Ulrich E. Rath Mineral Economic Research Co-ordinator
---	--

Federal Observers

Department of Energy, Mines and Resources
Department of External Affairs
Department of Finance
Department of Fisheries and the Environment
Department of Industry, Trade and Commerce
Department of Labour
Department of Regional Economic Expansion

Secretary: Mr. E.J. Ward
Director General
Resource Industries Branch
Department of Industry, Trade and Commerce

* Deputy Chairman
** Alternate

SUBMISSIONS, BACKGROUND PAPERS AND
CORRESPONDENCE CONSIDERED BY THE TASK FORCE

In addition to the appendices to this report and the very considerable volume of background material supplied by the Department of Industry, Trade and Commerce, the task force took into consideration a number of other submissions either from the members themselves or generated as a result of their inquiries. A list of these follows, and copies can be obtained from the secretary of the task force.

Re Investment Climate

1. Correspondence relating to LIFO inventory accounting between A. Powis and G. Ritchie (Director General, Policy Analysis, ITC), April 14 and May 1, 1978.
2. Paper on taxation and LIFO inventory accounting from D.A. Thomas, May 4, 1978.
3. Correspondence relating to investment and tax reform from H.T. Fargey, May 23, 1978.
4. Correspondence relating to encouraging new investment and the raising of equity capital from D.W. Davis, April 27, 1978
5. Estimated federal revenues from taxation of capital gains from 1972-76 from the Department of Finance (undated).
6. Correspondence relating to conflicting government policies from H.T. Fargey, May 10, 1978.

Re Further Processing, Transportation and Trade

1. Background paper on further processing, required development, transportation and international trade from D.D. Elliott, April 25, 1978.
2. Background paper on competition and trade policy from W.E. Stracey, May 3, 1978.
3. Background paper on further processing - smelting and refining from A. Powis, April 25, 1978.
4. Background paper on upgrading of zinc minerals from H.T. Fargey, April 17, 1978.
5. Correspondence relating to upgrading from secondary sources from D.A. Thomas, May 4, 1978.
6. Review of the report of the British Columbia Copper Task Force by Lorne Sivertson, September 1975.
7. Letter from A. Powis to H. Corrigan regarding further processing beyond the prime metal stage, May 12, 1978.
8. Papers prepared for the conference of Deputy Ministers of Mines, November 1977, by the Department of Transport:
 - a. Working Paper, Transportation and the Minerals Industry in Canada.
 - b. Impact of Transportation Costs on the Mining Industry (Industry Survey) New Brunswick.
 - b. Summary data re Transportation and the Minerals Industry.
9. Comments regarding commodity agreements from A. Powis, April 13, 1978.

Re Environment and Research and Development

1. Comments re economic impact of proposed environmental regulations from D.A. Thomas, May 4, 1978
2. Comments re environmental issues from Inco Limited (A.J.R. Smith), May 1978.
3. Comments re environmental issues and research and development, H.T. Fargey, May 23, 1978

Re Manpower and Labour

1. Comments re manpower and labour topics from H.T. Fargey, May 23, 1978

Re Sectoral Study

1. Comments on the sectoral study on the non-ferrous metals industry: an Inco perspective, May 1978.
2. Comments on the sectoral study by A. Powis in a letter to E.J. Ward, April 14, 1978.

SECTOR PROFILE

NONFERROUS METALS

The following profile of the Canadian Non-ferrous Metals Industry was developed by the Sector Task Force on the Canadian Non-ferrous Metals Industry from a profile prepared by the federal Department of Industry, Trade and Commerce.

NONFERROUS METALS

DEFINITION

In this profile, the sector is defined as the mining, concentration, smelting, refining and semi-fabrication of nonferrous metals. Uranium, while a nonferrous metal, is regarded as an energy mineral and will not be considered here. This profile deals principally with the five major metals produced in Canada — aluminum, copper, lead, nickel and zinc.

INTRODUCTION

The volume of world nonferrous production is small compared with that of iron and steel but the value per unit of weight is much higher. Aluminum and copper are used directly for structural purposes and electrical transmission. The other major nonferrous metals are not used on their own to the same extent. Nickel is used mainly for alloying with other metals; much zinc is used to coat steel (galvanized steel); and 50 per cent of lead is used in the production of batteries.

Nonferrous metals are obtained by mining ores which are then processed in various ways to make metal. Most nonferrous metal ores are mined in Canada. Metal contents of most nonferrous ores are relatively low (e.g. about one per cent for some copper) and they are mined and processed at the mine site into concentrates which have a higher metal content (e.g. 25 per cent for copper). The concentrates are exported as such or smelted and refined into metal in Canada. In the case of aluminum, the major ore (bauxite) is not found in Canada. Its metal content, about 25 per cent, is shipped to Canada which has been able to supply the abundant, cheap electric power required for smelting into metal. In the case of aluminum and copper the Canadian industry also converts some of the refined metal produced into semi-fabricated form-sheets, bars, rods, etc.

The nonferrous metals industry in Canada covers more than 30 different metals with diverse properties and end uses. In 1975, it employed 102,000 people, 51.9 per cent in mining, 34.9 per cent in smelting and refining and 13.2 per cent in semi-fabrication. The total value added in Canada was \$3.2 billion; 63.1 per cent in mining, 27.8 per cent in smelting and refining and 9.1 per cent in semi-fabrication. Further details are given in Appendix A.

A few large companies, integrated from mining through manufacturing, play a major role in the industry. Therefore, it is difficult to consider the smelting and further manufacturing functions in isolation. Accordingly, this profile will provide a brief review of the mining operations before discussing smelting and refining and further manufacturing.

The nonferrous metals industry is heavily export oriented and in 1976 contributed \$3.7 billion to total Canadian exports of \$37.3 billion (9.9 per cent of the total). By way of comparison exports of ferrous ores, scrap and primary iron and steel amounted to \$1.1 billion, or 3.0 per cent of total exports.

EXPORTS OF NONFERROUS METALS, 1976
billions of dollars and percentage of total

	<i>Value</i>	<i>% of Total</i>
Ores, concentrates and scrap	1.5	40.6
Nonferrous metals (primary and semi-fabricated) excluding aluminum	1.7	45.9
Aluminum (primary and semi-fabricated)	.5	13.5
Total	3.7	100.0

The nonferrous industry, as other primary resource industries, is subject to extensive regulation by governments, especially in mining. Minerals are today owned by the provinces and, in the Yukon and Northwest Territories, by the federal government and their extraction is licensed by these authorities. Some of the older mining claims are owned by the mining companies. Special federal and provincial mining taxation arrangements apply to mining and primary metal production.

MINING

Canada is the world's largest mine producer of zinc and nickel; second in molybdenum, columbium, selenium, titanium (and uranium); third in lead and silver; and fourth in copper. With the exception of bauxite, tin, zirconium, chromium and manganese, Canada has extensive indigenous resources of most other ores.

CANADIAN MINE PRODUCTION OF THE LEADING NONFERROUS METALS, 1976
Value of Metal Content in Millions of Dollars

Nickel	1,232	Silver	175
Copper	1,126	Lead	129
Zinc	862	Molybdenum	92
Gold	208		

(The output of Canadian primary aluminum smelters, using imported ores, would have been worth an estimated \$900 million in 1976 were it not for a strike that year.)

Mining and processing of metal ores

Nonferrous metal ores with the exception of those containing aluminum, are less widely distributed in the world than iron ore and their metal contents are much lower than commercial deposits of iron ore. To save transport costs these ores are concentrated close to the mines. In some cases, they are then shipped elsewhere for smelting and refining, either in Canada or overseas. The type of ore determines the possibilities for concentration. Zinc concentrates range typically from 50 to 60 per cent zinc, copper concentrates from 25 to 30 per cent copper, sulphide nickel concentrates from eight to 10 per cent nickel, and lead concentrates from 35 to 75 per cent lead.

The metal content of an ore deposit is only one of several factors that determine its economic viability. Others are size of the deposit, accessibility of the ore (geographical location, terrain, depth of the deposit from the surface, deposition, nature of covering rocks or earth), and physical and chemical characteristics of the ore which determine the economics of the concentration and/or smelting of the contained metals.

Co-production of nonferrous metals other than aluminum is an important characteristic of many Canadian mines, and is found to a greater degree in Canada than in most other countries. Lead and zinc tend to be found together in ores which commonly contain metal in the range of five to 10 per cent. Nickel ores in the Sudbury area contain nickel, copper and some precious metals. Low grade copper deposits in British Columbia frequently contain molybdenum.

Canada's copper deposits are substantial, but other countries such as Zambia, Zaire and Chile are mining higher grade ores, generally in large open pit deposits. Nickel from some Canadian mines is

produced at lower cost than from most mines in other countries. Although Canadian mines are underground and those in other countries open pit, the nickel in Canadian ores is more readily separated, and copper and precious metals obtained as by-products.

The industrialized countries, especially the U.S., are actively investigating the possibility of recovering nickel, copper, cobalt and manganese from nodules found on the seabed. Commercial mining of these nodules may take five to 10 years to develop as some new technology is required. The final cost of recovering seabed minerals is likely to be much higher than that of land based minerals. There is some concern that if price levels are not sufficient to cover the costs of deep-seabed mining governments might resort to subsidies or other measures favouring seabed mining with possible adverse effect on Canadian mine production, particularly nickel. In this context the main area of concern relates to the U.S. market.

Adequacy of existing known reserves and exploration for new reserves

Studies conducted by the Department of Energy, Mines and Resources (EMR) and reported in EMR Mineral bulletin MR 169, indicate that for the five nonferrous metals — nickel, copper, zinc,

CANADIAN NONFERROUS METALS PRODUCTION, RESERVES AND RESOURCES, 1975-2000
(Quantities are in terms of "P", which represents the tonnage of metal produced from ores mined in Canada in 1975)

	Nickel	Copper	Zinc	Lead	Molybdenum
<i>Production of metal from ores mined in Canada</i>	1P	1P	1P	1P	1P
Cumulative mine production, 1975-2000, needed to meet forecast domestic requirements and anticipated export opportunities (refined metal)	30P to 35P	37P to 47P	32P to 41P	28P to 39P	51P to 129P
Forecast annual increase in Canadian metal production ¹ 1975-2000	1.2-2.2%	2.6-4.4%	1.5-3.5%	0.5-3.0%	n.a.
Reserves, 1975, in producing mines and in deposits being developed for production					
(i) metal in ore	30P	23P	26P	28P	27P
(ii) refined metal ²	24P	20P	21P	21P	19P
Additional metal reserves needed to meet cumulative production, 1975-2000, and to maintain reserve levels commensurate with expected production levels after 2000 A.D. (metal in ore)	47P to 64P	63P to 98P	53P to 87P	40P to 83P	127P to 510P
Estimates of metal resources from which the additional metal reserves must be sought (metal in ore)					
Surmised metal tonnages, mostly additional to reserves in mining districts	15P to 75P	10P to 30P	10P to 20P	10P to 20P	10P to 50P
Discovered but undeveloped deposits, mostly subeconomic at present	12P ³	25P ³	15P	17P	59P
As-yet-undiscovered deposits in regions outside mining districts that — if found now — would be considered economically mineable	4P to 35P	50P to 200P	20P to 30P	15P to 35P	100P to 500P
As-yet-undiscovered deposits that — if found now — would not be considered mineable but that might become so before the year 2000 A.D.	—————substantial—————				

¹Average annual growth rates for 1960-1975 were about: nickel 2%, copper 5%, zinc 8%, lead 4%.

²Metal in ore less milling and smelting/refining losses.

³Does not include Sudbury region, for which information is insufficient.

lead and molybdenum — known Canadian resources, together with those thought to exist, are extensive enough to allow current production levels to continue, and to grow, up to and beyond the year 2000. The table on page 3 summarizes the EMR estimates.

No fundamental supply problems caused by a lack of resources of these metals are in sight for the next two or three decades. However, the transformation of undiscovered resources to reserves in producing mines may take as long as 20 years. A high level of successful exploration activity must be maintained if Canadian mine production of nonferrous metals is to grow at the rates required.

Mineral exploration activities are cyclical in nature and related to levels of metal prices and mining profits. The following table shows that expenditures on mineral exploration reached a peak in 1970, a low in 1972, and have generally increased over the period 1972-1976.

EXPENDITURES ON MINERAL EXPLORATION 1967-76⁽¹⁾
(millions of constant 1975 dollars, using GNE deflator series)

<i>Year</i>	<i>On-property</i>	<i>Outside</i>	<i>Total</i>
1967	36	89	125
1968	52	121	173
1969	59	155	214
1970	38	178	216
1971	39	133	172
1972	23	100	123
1973	29	110	139
1974	28	123	151
1975	26	129	155
1976 ^a	35	119	154

⁽¹⁾excludes oil and gas. *p* - preliminary. Calculated from Statistics Canada data.

It is not clear whether the 1972-76 increase reflects actual expansion in exploration effort because exploration costs may have increased more rapidly than the GNE deflator series. In fact, current limited employment opportunities for personnel in mineral exploration suggest a decline in actual Canadian exploration activity that may do serious damage to organized exploration expertise.

The level of exploration needed to meet forecast requirements from Canadian mines may not be attained unless industry can reasonably foresee an acceptable investment return on new discoveries. Today's metal prices, profits, and level of demand are regarded as too low to justify further investment. In addition, the present uncertainty of the Canadian investment climate affects the level of exploration.

To be certain that new reserves and production capabilities are being developed at the required pace, EMR has devised a monitoring system that will gauge, each year, the ability of Canada's mining industry to sustain levels of mineral supply to meet domestic needs well into the future, as well as to take advantage of export opportunities.

Imported ores

In the case of aluminum, bauxite is mined in tropical countries including Jamaica, Guyana, Australia, Guinea and Brazil and shipped to Canada for smelting either as bauxite or, after onsite processing, as alumina (aluminum oxide). Known world bauxite reserves are 14.5 billion tons. Bauxite producers have formed an international association designed, among other objectives, to improve returns from resources but their ability to raise prices may be limited by the existence of large quantities of aluminum-bearing clays throughout the world. These can be processed at a somewhat higher cost than bauxite and their processing costs could provide a maximum possible price for bauxite. Canada has large deposits of these clays.

Structure of the industry

Nonferrous mining and primary metal production are capital-intensive industries and a large part of nonferrous metals production is from large firms, many of them multinationals and completely integrated from ore to refined metal and semi-fabricated products. Their Canadian-based

production facilities for concentrates and primary metals have proved capable of competing in international markets.

The major companies are described more fully under the manufacturing sections (smelting and refining) that follow. Those engaged in mining operations in Canada are: Inco (nickel, copper); Falconbridge (nickel, copper); Noranda (copper, lead, zinc); Texasgulf (copper, zinc); Hudson Bay Mining (copper, zinc); Sherritt Gordon (copper, zinc); and Cominco (zinc, lead).

The regional distribution of the nonferrous mining industry is also shown. Many of the mines are in remote areas and have some difficulty obtaining a sufficient supply of skilled labour, particularly during periods of full employment. Some are sole sources of employment for their communities. Most single industry communities which rely on nonferrous metals are listed in Appendix D.

REGIONAL DISTRIBUTION OF THE NONFERROUS MINING INDUSTRY IN CANADA
Number of mines⁽¹⁾

	<i>Atlantic</i>	<i>Quebec</i>	<i>Ontario</i>	<i>Prairies</i>	<i>B.C.</i>	<i>Yukon /NWT</i>	<i>Total</i>
Copper	9	26	23	14	21	4	97
Lead/zinc	9	12	12	4	14	4	55
Nickel	—	—	20	6	—	—	26

Mine production (metal content), 1976
000 short tons

Copper	18.1	132.5	284.9	72.9	300.9	12.6	821.9
Lead	78.1	1.1	6.6	—	97.9	101.2	284.9
Zinc	239.1	135.2	352.0	77.1	124.6	215.6	1,143.6
Nickel	—	—	199.2 ^c	70.2 ^c	—	—	269.4 ^c

^cestimate

Mining employment 1975
000's

	3.2	7.2	25.1	7.0	8.1	2.3	53.0
--	-----	-----	------	-----	-----	-----	------

(nickel-copper mines 38 per cent, copper-gold-silver mines 33 per cent; silver-lead-zinc mines 12 per cent)

Value of Metal in Ores Produced as Per Cent of GPP or GDP

	2.5	.9	2.8	1.3	4.6 ⁽²⁾	2.3
--	-----	----	-----	-----	--------------------	-----

⁽¹⁾Single companies often own several mines.

⁽²⁾Covers both B.C. and Yukon /N.W.T.

International competitive position

Canada has accessible supplies of most minerals of economic importance and uses advanced mining technology. Some developing countries are exploiting or discovering higher grade ores and when demand is weak and prices low some are willing to continue operating at a loss.

Prices of most nonferrous minerals mined (except nickel) fluctuate considerably and as prices decline mine owners decide whether to reduce or suspend production or to stockpile. Where mines are fully or partially government owned (as they are in a number of developing countries), there are often strong pressures to maintain production and sales levels even at a loss. Some private companies in developed countries react similarly for periods of time. Pressures arise from the dependency of some developing countries on nonferrous metals exports as a source of foreign exchange earnings and the need to maintain employment. This tends to accentuate the downward movement of prices in periods of weak demand and transfers to Canada and other developed countries, in some metals, disproportionate shares of mining unemployment or stockpiling.

In Canada there is a tendency for the average grade of ore mined in accessible areas to decline. This is true of all mature mining countries, but in developing countries large high-grade ore bodies are being discovered which improve their competitive positions relative to Canada's. Canada still has a cost advantage in nickel over most other producers and is the world's largest producer of zinc.

Canada's copper deposits are substantial but most other producing countries are mining higher grade ores. The efficiency of Canadian mines and the widespread occurrence of co-production of other metals with copper in Canadian mines has resulted in mining production costs which are generally lower than or competitive with costs in most of these countries. Recent discoveries of copper in Southeast Asia have been developed with Japanese assistance to provide Japan with new sources of copper concentrates (and conversely, expanded markets for Japanese manufactured goods).

In addition to resource endowment, other factors bearing upon Canada's international competitive position include taxation, royalties, technical expertise, and energy, labour and transport costs.

Technology applied by the Canadian mining industry is as advanced as that found anywhere. Mining skills and international marketing organizations are significant assets of the larger mining companies. These mining and marketing skills are supported by an excellent capability in airborne survey work, land surveys and mine development. These positive competitive strengths are exploited in the pursuit of overseas mineral discoveries and mining development.

The pricing structure of the major nonferrous metals, excluding aluminum, results in most price fluctuations for the metal being reflected in the price received by the mining company for the concentrates.

Since 1975, the markets for nickel, copper and zinc have been soft resulting from the recession and the slowness in recovery in many industrial countries. This is discussed further under "Smelting and Refining".

SMELTING AND REFINING

Nature of smelting and refining

In the case of most nonferrous metals, ores and concentrates are converted into metal in a smelter. The metal is further purified in a refinery. For aluminum, bauxite is converted into alumina by a chemical process and refined aluminum metal is produced electrolytically from the alumina, in a smelter.

Smelting and refining are capital and energy-intensive. In Canada in 1973, nonferrous smelting and refining used \$61,000 of assets per employee (written down value), iron and steel mills \$42,000, and all manufacturing \$19,000. Nonferrous smelting and refining consumed \$4,000 of energy per employee, iron and steel mills \$1,600, and all manufacturing \$700. Most energy and capital costs have increased greatly in recent years, although recent technological advances are reducing energy requirements in smelting.

Aluminum smelting is carried out in Canada because of extensive, low-cost, hydroelectric power resources. Smelters are located near power sites and tidewater. The smelting of most other nonferrous metals requires considerably less energy and the location of smelters depends on many factors; proximity to mines or markets, transport facilities, tariffs and energy supplies. A single smelter is often fed concentrates from several mines not necessarily owned by the smelting company.

Conventional smelting in Canada of copper, lead, zinc and nickel sulphide ores produces large quantities of sulphur dioxide. Environmental controls require the reduction of the sulphur dioxide in smelter gas emissions. This is costly if no commercial markets are available for the sulphuric acid which can be produced from the sulphur dioxide. In copper production, for example, the collection and neutralization of 50 per cent of the sulphur dioxide may cost about four cents per pound of copper. In an existing plant the cost would normally be considerably higher than this, because of the high capital cost associated with improvements to existing facilities to increase the sulphur dioxide concentration in the gas streams. There are savings if the sulphuric acid can be sold and not neutralized. A proposed joint industry/government study is to investigate market possibilities for nonferrous smelter sulphuric acid.

Sherritt Gordon is using a chemical (hydrometallurgical) process for producing nickel and cobalt from sulphide concentrates and mattes. The process converts sulphur to ammonium sulphate which is sold as fertilizer. Development work by Sherritt Gordon in co-operation with Cominco has been successful in producing elemental sulphur from concentrates of copper and zinc. Such processes avoid major pollution problems associated with sulphur dioxide emissions but may involve substantial water pollution problems.

Smelting and refining add value and cost to Canada's exports of nonferrous metal concentrates which should be upgraded where Canadian strengths and competitive advantages allow and where such an activity is economically viable. It complements the strong Canadian mining industry and is important as a link in vertical integration into semi-fabricated products.

Markets, trade, tariffs

There is a large international trade in nonferrous concentrates and refined primary metal between countries like Canada — which possess the ores or in the case of aluminum, have large supplies of cheap electricity for smelting — and countries which have deficits of these. The main importers are industrial countries.

Canada's general trading position in 1976 is summarized as follows. Domestic consumption does not include inventory changes.

PRODUCTION, CONSUMPTION AND EXPORTS OF NONFERROUS METALS, 1976
000's of short tons

	Copper	Zinc	Lead	Nickel	Aluminum
Metal content of ore mined and concentrated	822	1,275p	285p	289	Nil
<i>Primary Metal</i>					
Production from concentrates	537	519	173	196	539
Domestic consumption	227	147	81	13	428
<i>Exports</i>					
Concentrates (metal content)	340	713	155	80 ⁽¹⁾	
Metal	345	385	126	96	558

p — preliminary

⁽¹⁾ Nickel matte with 45–75 per cent metal content.

MAIN DESTINATION OF EXPORTS, 1976

<i>Concentrates (metal content)</i>				<i>Metal</i>		
	Japan	EEC	U.S.	EEC	U.S.	Other (excl. Japan)
Copper	70%			58%	27%	
Zinc	16%	67%			78%	
Lead	53%		20%	44%	34%	21%
Nickel		51% ⁽¹⁾		16%	73%	
Aluminum					70%	24%

⁽¹⁾ Nickel matte.

The highest tariffs apply to aluminum (in the EEC and Japan) and nickel (in Japan); even the lower levels of tariff such as those on lead and zinc imports into the EEC can be detrimental to the Canadian smelting and refining industry. The effective rates of tariff protection on the refining of lead and zinc are significantly higher than the nominal rates.

PRESENT TARIFF POSITION OF NONFERROUS METALS

Product	Canada	U.S.	EEC	Japan
<i>Ores and Concentrates</i>				
Bauxite	Free	Free	Free	Free
Copper	Free	Free	Free	Free
Zinc	Free	.67¢/lb (suspended to 1978)	Free	Free
Lead	Free	.75¢/lb (say 2.5%)	Free	Free
Nickel	Free	Free	Free	Free
<i>Primary Metal</i>				
Aluminum	1¢/lb (say 2%)	1¢/lb (say 2%)	7%	9%
Copper	Free	.8¢/lb (say 1%)	Free	Varies with metal value 40¢/lb—6% 60¢/lb—4% 83¢/lb— or more } Free

Product	Canada	U.S.	EEC	Japan
Zinc	Free	.7¢/lb (say 2%)	3.5%	Varies with metal value 20¢/lb—7% 34¢/lb—4% 35¢/lb— } Free or more }
Lead	Free	1.0625¢/lb (say 3.5%)	3.5%	Varies with metal value 15¢/lb—6% 16¢/lb— } Free or more }
Nickel	Free	Free	Free	25¢/lb (say 11.5%)
<i>Semi-Fabricated Shapes</i>				
Aluminum—sheet, bar, etc.	2¢/lb (say 2%)	2¢/lb (say 2%)	12%	14.4%
—sections, tubes	12.5%	9.5%	12%	12.8% (tubes only)
Copper—sheet, bar, etc.	5%	Copper—1.4¢/lb (say 1%) Brass—.8¢/lb plus 1%	8%	12%
—sections, tubes	5%	Copper —tube 2.6¢/lb (say 2%) —shapes .6¢/lb plus 11%	8%	12%

The above are rates charged now, not necessarily GATT bound rates. The latter are generally higher in the case of Japan, being 8.5 per cent (primary copper) 7.5 per cent (lead) 18 per cent (aluminum bars) 16 per cent (aluminum tubes) 15 per cent (copper semi-fabs).

STRUCTURE OF THE INDUSTRY
Regional Distribution of the Nonferrous Metal Industry

	Atlantic	Quebec	Ontario	Prairies	B.C.	Yukon /NWT	Total
<i>Number of smelters and refineries</i>							
Aluminum smelters	—	5	—	—	1	—	6
Copper smelters	—	2	2*	1	1	—	6
Copper refineries	—	1	2*	—	—	—	3
Lead smelters and refineries	1	—	—	—	1	—	2
Zinc smelters and refineries	—	1	1	1	1	—	4
Nickel smelters	—	—	2	1	—	—	3
Nickel refineries	—	—	2	2	—	—	4
<i>Employment 1975 (000's) estimate</i>							
Aluminum	—	10.3	—	—	2.4	—	12.7
Copper smelting and refining	—	3.1	1.3	.5	—	—	4.9
Lead/zinc do.	.5	.7	.5	.4	2.1	—	4.2
Nickel do.	—	—	1.0	.5	—	—	1.5
Other (more than one metal)	.5	2.6	7.2	.6	1.1	—	12.0

*Includes Texasgulf smelter and refinery under construction.

There is only one small copper smelter in British Columbia and most mine output is exported as concentrate. Today there is excess copper smelting capacity in Eastern Canada, which will be increased in the early 1980s when Texasgulf completes a new smelter at Timmins, Ontario to handle its ores, rather than in the Rouyn-Noranda smelter in Quebec. Some smelters and refineries are the only source of employment in their communities. A list of some of the "single-industry" communities which rely on nonferrous metals is given in Appendix D.

As smelting is highly capital-intensive, most nonferrous metal producers are large firms, many of them multinationals integrated from ore to refined metal to semi-fabricated products. Many have appreciable mining and metal interests in other countries. In recent years for example, Alcan Aluminum has derived the bulk of its profit from operations in other countries, not from Canada. Inco and Falconbridge have greatly increased their capital expenditures outside Canada recently.

The major companies are Alcan (aluminum), Reynolds (aluminum), Inco (nickel, copper), Falconbridge (nickel, copper), Noranda (copper, zinc, lead), Texasgulf (copper, zinc), Hudson Bay Mining (copper, zinc), Sherritt Gordon (copper, zinc, nickel), Cominco (zinc, lead). Of these, Reynolds, Falconbridge, Hudson Bay Mining and Sherritt Gordon are foreign controlled. Alcan, Inco, Noranda and Cominco are Canadian controlled as to number of shares registered in Canada. Thirty per cent of Texasgulf shares are owned by the Canadian Development Corporation.

Labour relations in general are much the same as in the rest of Canadian industry. Some long strikes, such as the five-month strike by Alcan's Quebec smelter employees in 1976, have occurred. The smelters and many of the mines are normally able to obtain a sufficient supply of skilled labour.

Profitability

The smelting and refining of copper, zinc and lead, is generally regarded as being less profitable than mining.

The copper, lead, zinc and nickel industries have been profitable in the past but may be less so in the next few years. The aluminum industry has not been profitable in the past but may be in the future.

Most nonferrous metals operations have been relatively profitable during the past 20 years. During 1969-1976 for example, the profit before tax and interest of six major Canadian companies producing copper, zinc, lead and/or nickel averaged 12.4 per cent of total assets (ranging from 7.7 per cent in 1971-72 to 17.7 per cent in 1973-74) and net income as a percentage of equity averaged 13.3 per cent. In the relatively favourable 1960's the net income of U.S. manufacturing industry as a whole averaged about 13 per cent of equity (this measure is often used as a yardstick) while that of Canadian manufacturing industry averaged less than 10 per cent. Copper, zinc, lead and nickel profits have been maintained in the past primarily because the large companies have generally not over-expanded capacity and because long strikes and other supply interruptions which have affected significant portions of the industry have, in some cases, resulted in higher prices for long periods.

This position may now be changing. A large part of world copper production (about 40 per cent) is now in the hands of governments of developing countries (Zambia, Zaire, Chile, Peru). Some developing countries seem unwilling to reduce employment and foreign exchange earnings when demand falls and therefore accept lower prices rather than reduce output. New nickel mining and smelting capacity has been established by Inco and Falconbridge in developing countries such as Indonesia and the Dominican Republic, and similar pressures are felt there. Copper, zinc, and nickel metal prices have remained relatively depressed for some time and the profit prospects of the major companies during the next few years do not seem as favourable as in the past.

The world aluminum industry has not been very profitable during the past 20 years. During 1969-76 for example, Alcan Canada's profit before tax and interest averaged 6.4 per cent of total assets (ranging from 2.4 per cent in 1975-76 to 11.1 per cent in 1969-70), and net income as a percentage of equity averaged 5.8 per cent. (Alcan Aluminium which includes Alcan Canada and overseas interests, showed figures of 7.6 per cent and 7.3 per cent.) Aluminum profits have been low mainly because the industry throughout the world has, since the early 1950s, consistently over-expanded, and continued to operate at rates in excess of demand and attempted to sell its entire output by reducing prices to the level of costs.

This position now seems to be changing. North American and Japanese producers have recently begun to reduce their output significantly when demand falls rather than lower prices. Prices of aluminum's main competitor, steel, have risen appreciably, by 70 to 80 per cent in Canada, since the beginning of 1973. As a result of these and other factors primary aluminum prices have recently risen significantly. In the U.S. prices rose from 25 cents per pound in 1973 to the current 53 cents per pound. Prices have increased more than costs since 1973, and profits have increased from low to more adequate levels.

Pricing methods

Methods of establishing prices of nonferrous metals in the world vary. Aluminum prices are established by the major producers in each area. The same holds for nickel and for most transactions in zinc. For copper, and to a lesser extent for lead, there is a dual price system. Most transactions in these metals take place in North America at a price established by producers, and most sales elsewhere at the London Metal Exchange (LME) price. The latter price reflects marginal changes in

world supply and demand and is subject to considerable fluctuation. A chart of world copper prices for 1965-76 is shown in Appendix B. In general, producer prices are related to LME prices.

Producers and consumers are trying, under the auspices of UNCTAD, to develop methods of stabilizing copper prices. The International Lead-Zinc Study Group has already had some success with lead and zinc.

International competitive factors

Existing facilities are competitive in export markets. The development of copper smelting in British Columbia is restricted by Japanese competition and the difficulty of disposing of the process's sulphur dioxide by-product. Construction of the Texasgulf smelter was encouraged by the Ontario tax allowances for processing introduced in 1974. In aluminum smelting Canada has the advantage of much lower power costs, through existing hydroelectric installations.

For copper, zinc and lead, there is world competition in the operation of smelters and refineries which is to a large extent independent of the metals prices. Captive facilities vertically integrated with mine production are less affected by international competition than facilities such as Noranda's, which rely heavily on custom smelting and refining. There is normally a variable surplus of smelting and refining capacity available in the world, and competition between smelters and refiners has left the return on investment in such facilities quite low.

In their contracts for the purchase of British Columbia concentrates, the Japanese have traditionally offered higher prices for the concentrates for smelting and refining in Japan in order to ensure security of supply. The differential has been recovered through higher prices for the copper sold in Japan's domestic market. High Japanese domestic copper prices are possible through protection of this market by trade barriers and other factors which inhibit imports of metal. Canadian companies which have investigated the feasibility of establishing copper smelting and refining in British Columbia have found they cannot afford to meet prices paid by the Japanese for concentrates, and make an acceptable return on the investment.

Another important factor in the location economics of smelting and refining is the utilization of the sulphur content of concentrates. There is an advantage in locating smelters where there are large accessible markets for sulphuric acid. The Japanese market for sulphuric acid, accessible from British Columbia, is now fully supplied from the by-product of its smelting industries. There has been a good market for acid in Eastern Canada. As there seems to be a surplus of acid production, a joint industry/government study is to investigate additional export possibilities.

For many years, Canada had the advantage of a stable taxation system that included tax incentives comparable to those of other countries. The industry now must find and develop substantial new mines to maintain adequate feed to existing smelters and those under construction, and the present level of exports. To many investors in such projects, however, Canada now has some unfavourable aspects, in particular its tax system now appears uncertain. This question is examined further in following pages. Uncertainty about the future of Quebec creates additional unease for investors.

Aluminum smelting in Canada has a significant advantage over most other countries in power availability and cost. Alcan has its own hydroelectric generating facilities and costs are believed to be less than three mills per kilowatt hour, (or about 2.3 cents per pound of aluminum ingot, assuming eight kwh per pound). Other countries' power costs, except Norway and Middle East oil countries, are considerably higher. Many U.S. plants have low power costs today in their present power contracts but these costs are likely to be increased in the 1980s. New hydroelectric installations in Canada are also likely to be expensive. Power from the James Bay Hydro project is expected to be much higher in cost than Alcan's existing power. As the Canadian industry depends on exports to a very great degree any power advantage is needed to offset advantages that the industry located in foreign local markets may have such as lower freight costs to customer, various operating cost advantages other than power, and no duty or non-tariff barriers.

Alcan considers that its existing smelters are now too old and need replacing and expanding at a total cost of \$1.5 billion to remain competitive. It should be able to take advantage of the latest technology when rebuilding.

There has been a tendency in Canada and elsewhere to promote, by incentives, the development of smelting and refining. For example, by amending its mining taxes in 1974 to provide deductible "processing allowances" for companies with operations in Northern Ontario (concentrating — eight per cent allowance; smelting — 16 per cent; refining — 30 per cent), Ontario has encouraged

the establishment of a copper smelter and refinery by Texasgulf at Timmins. It is understood Quebec has tried to encourage the establishment of new smelters in the province by offering low electric power rates to new establishments through Hydro Quebec. British Columbia has provided incentives to encourage the establishment of a copper smelter at Afton.

Capital costs are important in smelting and refining, and construction costs vary considerably depending on location. The Canadian climate is an adverse factor in building costs, and rates of interest in Canada are typically one to two per cent higher than in the United States.

Highly capital-intensive nonferrous metal companies have been affected more than others by increases in new capital construction costs in recent years. (A copper mine, smelter and refinery now cost more than twice as much per ton of metal capacity to build as in 1970.) They have helped to finance this by increasing their debt to maximum acceptable limits, i.e., with debt 35 to 40 per cent of debt plus equity. At the end of 1959, the long-term debt of six major companies (excluding Alcan) was 25.5 per cent of debt plus equity and at the end of 1976, it was 37.8 per cent. Alcan, classified as a utility because of its power plants, maintained about a 50 per cent ratio throughout.

In Canada the difficulty of raising additional financing may hinder expansion. By contrast, in some other countries, additional debt can be raised more easily, either from government sources or in the form of large short-term loans.

During 1969-76 the seven major companies met their cash needs roughly as follows (all figures in billions of dollars):

SOURCE AND APPLICATION OF FUNDS
(seven major companies)
billions of dollars

<i>Source of funds</i>		<i>Application of funds</i>	
Cash generation from operations	5.8	Dividends	1.7
New debt, net (+ new shares)	1.7	Fixed capital expenditures	5.2
		Working capital	.7
	7.5		7.6

Part of the cash generation came from overseas and part of capital expenditure was made overseas. The working capital figure above is a net figure covering a large increase in working capital requirements less a large increase in short-term debt (\$.6 bill. between end - 1969 and end - 1976) to help finance it.

In the immediate future, the recent large increases in the price of aluminum could assist Alcan in generating funds to finance the bulk of large expenditures to rebuild its Canadian smelters. Some companies may find the current, relatively slow growth of their cash generation and the present high level of their long and short-term debt reduce their ability to undertake as much new capital expenditure as they would like. A proportion of new capital available may be invested overseas since, among other things, Canada's investment climate has deteriorated and there are attractive ventures elsewhere.

Since 1975 the markets for nickel, copper and zinc have been soft as a result of recession and slow recovery in many industrial countries. In 1977 Canadian exports of nickel and zinc especially were still lower than in 1974. Large corporation and London Metal Exchange inventories of primary metal overhang the markets, and production cutbacks have occurred.

In Canada, severe reductions in employment have occurred in the nickel industry. Some 3,000 jobs were eliminated in the industry during the second half of 1977 and 1978 to date. The demand for nickel is associated with the demand for capital goods. The reduction in nickel demand has been accompanied by an increase in world nickel producing capacity.

Any appreciable rundown of inventories and increase in Canadian production of nickel, copper and zinc depends on the resumption of a higher rate of growth in industrial countries, and especially on an expanded demand for capital goods. It may require considerable time for 1975-76 levels of employment to be regained in the Canadian nonferrous metals industry.

Secondary Metal and Scrap

The above analysis deals with primary metal derived from newly-mined ores. In the case of copper, lead and aluminum a significant role is played by secondary metal reclaimed from scrap. Old scrap from wornout and used batteries is the major scrap source for lead. For copper and aluminum it is mainly new scrap, obtained from the cuttings, shavings, etc. arising from the processing and fabrication of the metals, plus some old scrap. Scrap is remelted, at times in the plant in which it is generated, in a separate remelt foundry, or in the primary metal refinery. There are independent companies in the secondary smelting business, some affiliated with Canadian primary metal producers.

In Canada in 1975, secondary metal from scrap supplied about 35 to 40 per cent of total lead metal consumption and some 25 to 30 per cent of aluminum and copper consumption.

SEMI-FABRICATED PRODUCTS

Semi-fabrication is mainly the processing of copper and aluminum into shapes such as sheet, rods and bars.

Types of semi-fabrication

The bulk of copper and aluminum consumed in Canada is further manufactured, first into semi-fabricated products (sheet, strip, plate, bars, rods, pipes and tubes, and structural sections) and subsequently into finished products (siding, storm doors, trailers, pots and pans, radiators, electric wire and cable). Production of semi-fabricated products tends to be market located. Domestic sales provide justification for establishment of production facilities, while exports usually occupy a minor proportion of production capacity.

Nickel is used in a variety of forms for alloying iron and steel and for electroplating. There is some rolling of nickel powder by Sherritt Gordon and Inco to produce metallic nickel strip for the manufacture of coin blanks. There is a highly specialized demand for high nickel alloy sheet and other mill products which have high performance characteristics, and are used in aerospace, etc., but total world demand for such products is quite small, and there are only two plants considered fully integrated producing a wide range of high nickel alloy products in the western world. Both plants are owned by Inco and are market located, one in the U.S. and one in Britain. There are other more specialized plants producing a narrower range of products. These plants are also market located, and most are in the U.S., Germany, France and Japan.

Atlas Steels, Canada, has produced some nickel products on a small scale for domestic markets, but recent studies show that there is no realistic prospect of setting up a world-scale plant in Canada to compete with Inco's existing plants in other countries.

Major uses for zinc are for galvanizing steel (54 per cent of Canadian consumption), die-castings, particularly for the automotive industry (15 per cent), alloying with copper (13 per cent).

Major end uses for lead in Canada are in lead/acid batteries, particularly for use in automobiles (45 per cent), and in chemicals (30 per cent).

Semi-fabricating is less capital-intensive than smelting and refining. In 1973 copper semi-fabricating used \$24,000 of fixed assets per employee, smelting and refining \$61,000, all manufacturing \$19,000. It is also less energy intensive. In 1973 nonferrous semi-fabricating consumed \$900 of energy per employee; smelting and refining, \$4,000; all manufacturing, \$700. Semi-fabrication is an industry in which it would be beneficial for Canada to expand, provided profitable markets could be found for the additional product.

Structure of the industry

Of the large Canadian controlled companies, Alcan has aluminum, and Noranda copper, semi-fabricating plants. Some large foreign owned companies also have plants in Canada — Reynolds (aluminum), Ratcliffs (brass and copper), Wolverine (brass and copper). In the case of aluminum there are some small extrusion plants owned by independent companies.

The regional pattern of the semi-fabricating industry is:

REGIONAL DISTRIBUTION OF THE SEMI-FABRICATING INDUSTRY

Number of plants

	<i>Atlantic</i>	<i>Quebec</i>	<i>Ontario</i>	<i>Prairies</i>	<i>B.C.</i>	<i>Yukon/NWT</i>	<i>Total</i>
Aluminum	—	8	12	3	2	—	25
Copper	—	4	5	—	1	—	10
<i>Employment (000's) 1975</i>							
Aluminum	—	1.9	3.9	n.a.	.2	—	6.0
Copper	—	1.2	2.3	—	.3	—	3.8
Other (more than one metal)	—	1.8	2.5	.2	.2	—	4.7

Profitability

There are no published figures available on the profitability of the copper and aluminum semi-fabricating industries. It is generally considered, however, that in the case of aluminum, semi-fabricating has been less profitable than primary metal production for most of the past 20 years.

Markets, Trade, Tariffs

Semi-fabricated products are generally protected by tariffs throughout the world. The main tariffs are as follows.

MAIN TARIFFS OF SEMI-FABRICATED PRODUCTS⁽¹⁾

	<i>Canada</i>	<i>U.S.</i>	<i>EEC</i>	<i>Japan</i>
<i>Semi-fabricated shapes</i>				
<i>Aluminum</i> —sheet, bar etc.	2¢/lb (say 2%)	2¢/lb (say 2%)	12%	14.4%
—sections and tubes	12.5%	9.5%	12%	12.8% (tubes only)
<i>Copper</i> —sheet, bar, etc.	5%	Copper—1.4¢/lb (say 1%) Brass—.8¢/lb plus 1%	8%	12%
—sections and tubes	5%	Copper tube 2.6¢/lb (say 2%) Copper shapes .6¢/lb plus 11%	8%	12%

⁽¹⁾Wire and cable are regarded as part of the electrical industry in this context and are not included above.

Nonferrous metals semi-fabrication tends to be located close to large markets, particularly in the case of low volume customized products such as castings and extrusions for which close co-operation with, and prompt service to, the customer are important considerations. There are other factors which contribute to the maintenance of this situation. Primary metal trade is large, generally unfettered by restrictive measures such as tariffs, and supported to some extent by commodity markets in the large industrialized countries. In addition, scrap generation and recovery occurs more in the large consuming areas such as the northeastern U.S. As a result raw material supply is geared to meet market located semi-fabricating needs. The uniformity and larger volumes of shipments, and lesser susceptibility to damage of primary metal compared to many semi-fabricated products, provides some cost advantages to primary metal transportation in terms of lower rates and, often, lower insurance costs. In addition, the pattern of trade is influenced by tariffs and other trade barriers which generally are much higher for semi-fabricated products than for primary metal.

Despite these factors, nonferrous metals semi-fabricated products are traded internationally, although in much lower volumes than primary metals. Semi-fabricated products trade is possible in the product areas where important economies of scale are achieved through volume production. As a result of the size and protection of these markets, large industrialized economies often benefit from advantages in the scale of their production of the more common semi-fabricated products such as sheet, bar, sections and tubes.

World trade in semi-fabricated products is relatively small. For example it represented about one-sixth of aluminum sector trade in 1975. The share of semi-fabricated products of the metals considered in this profile in overall trade of the metals has been increasing marginally.

Canadian trade in aluminum and copper semi-fabs during 1974-76 has been as follows (all figures in 000 short tons):

CANADIAN TRADE, ALUMINUM AND COPPER SEMI-FABRICATED PRODUCTS

	1974		1975		1976	
	U.S.	Total	U.S.	Total	U.S.	Total
<i>000's of short tons</i>						
<i>Aluminum</i>						
Imports ⁽¹⁾	64	71	29	35	34	41
Exports	22	53	12	27	12	30
<i>Copper</i>						
Imports	11	15	7	12	13	21
Exports	36	64	19	37	23	41

⁽¹⁾ Aluminum imports exclude imports of Canadian metal hot rolled in the U.S.

Canada has a deficit with the U.S. in aluminum semi-fabs and a surplus in copper. The former is partly of products not made in Canada, such as aircraft sheet and plate; the latter arises mainly from the export of tube and sheet products to selective markets in the U.S. The margin between exports and imports has declined recently in both cases, for example the surplus in copper being six times imports during 1966-68 and two times imports during 1974-76. At the same time the overall level of trade has declined.

International Competitive Factors

In general Canadian costs are more than American. Production runs are shorter as the market served is much smaller. Shorter runs mean more frequent tooling and process changes for the different alloys and shapes required, and higher unit costs. Labour costs are about 60 per cent of total semi-fabricating costs excluding the cost of the primary metal used. Canadian wage rates are higher than corresponding U.S. rates.

Capital costs (interest and depreciation) are in the order of 30 per cent of total semi-fabricating costs excluding metal costs. Current construction costs in Canada outside the main urban centres are some five per cent higher than in corresponding areas of the U.S., and long term interest rates for industrial corporations are one to two per cent higher. Equipment not made in Canada is permitted duty free entry from other countries and equipment costs are in general competitive with those of U.S. plants.

Most Canadian brass and copper products, despite the Canadian trading surplus in certain select markets, are not competitive with corresponding U.S. products because of the higher basic costs outlined above. Aside from disparities in the total costs of transforming copper metal to semi-fabricated products, differences in prices for the basic metal can significantly affect the international competitive position of producers of copper semi-fabricated products. For example, during the past year the London Metal Exchange F.O.B. price for primary copper (used by European semi-fabricators) has been five to 10 cents per pound lower than the North American producer price — a large enough difference to enable European fabricators to export copper and brass products to Canada.

At other times in the business cycle, for extended periods the L.M.E. price for primary copper is higher than the North American producer price. This gives North American producers of semi-fabricated copper a competitive advantage over producers in other parts of the world. However, this advantage cannot be exploited in terms of increased exports of semi-fabricated products because North American copper producers allocate the quantities supplied at the lower prices, on the basis of the buying history of individual customers, plus a small allowance for growth.

MAJOR ISSUES AND THE FUTURE

Mineral policy

There are conflicting views about the speed with which Canadian nonrenewable resources should be exploited. Some appear to favour the development of resources consistent with world demand prospects. Conservationists would probably wish to see exports decline to provide for future domestic needs, in which case more labour and capital might be diverted to other industries. The issue involves economic, political, strategic, and federal/provincial aspects. EMR has published papers on this subject and has engaged in extensive discussions on the matter.

The nonferrous metals industry is energy-intensive, particularly at the smelting and refining stage and requires strict environmental controls. Any future growth suggested for it will take into account the conservation of energy and pollution control.

World demand for nonferrous metals is unlikely to increase as rapidly during the next 30 years as the last 30. The potential for general economic growth does not seem as large and there are no indications of drastic changes, such as the great increase in the size of aluminum operations during the Second World War, which together with government interventionist policies halved aluminum smelting costs between the 1930s and 1950s and led to aluminum growth rates of 9.5 per cent per year to the early 1970s.

The future long term rate of growth in world demand, uncertain as it is, is easier to project than to forecast the rate of growth of Canadian supply, which can be significantly influenced by governments' policy. Major factors affecting the future growth in Canadian supply are taxation, the general investment climate, and foreign resource development.

Taxation

Taxation must be a major element in any mineral policy. The actions of federal and provincial governments as regards mining taxation in recent years have greatly shaken investor confidence. It may require years to restore confidence.

In Canada, federal and provincial mining income tax regulations apply to mining, concentrating, smelting and refining (including aluminum smelting). In addition provincial mining taxes are levied on mining but not on concentrating, smelting and refining. Manufacturing tax regulations apply to semi-fabricating. The manufacturing regulations are relatively generous compared with those of other countries and involve a 40 per cent income tax rate, 50 per cent p.a. depreciation on equipment and 5-10 per cent investment credits.

The analysis of mining tax regulations on page 16 attempts to compare the income and royalty taxes, both central and local, of various countries on mining. It does not include property taxes or indirect taxes on supplies such as gasoline. It is not complete but it does seem to show that in many ways existing Canadian regulations are as favourable for investors in mining, smelting and refining as those of countries such as the United States, Ireland, Australia, New Zealand, South Africa, Brazil, Mexico, Iran, Indonesia and New Caledonia.

In addition to the taxes shown on page 16, withholding taxes are applied on all dividends and interest paid to non residents, and in many cases, including Canada, there are some restrictions on investment by foreigners.

In Canada today the total corporate income tax rate on concentrating, smelting and refining is about 37—27 per cent federal and an average of around 10 per cent provincial. Mining bears the same 37 per cent and in addition a provincial mining tax which is levied on mining income. In B.C., New Brunswick and Newfoundland the mining tax is 15 per cent to 17½ per cent and in Manitoba, Ontario and Quebec, it is at graduated rates varying between 0 and 40 per cent. The total tax rate on mining (federal income + provincial income + provincial mining tax) becomes comparatively high when graduated mining tax, after taking account of allowances in Ontario and Quebec for further processing, goes beyond the 15 per cent to 20 per cent range.

Tax-related reasons for the reluctance of Canadian and foreign investors to invest in Canadian mining and smelting lie partly in present tax regulations but probably more in the uncertainty felt by investors concerning the entire tax system. There are two tax systems operated by federal and provincial authorities respectively. There is need for a co-ordinated approach by the two levels of government to stabilize the tax structure across Canada. Federal authorities have reduced their tax rate to 27 per cent in order to recognize the payment of income and mining taxes to the provinces. Nevertheless investors question the stability of this or any other arrangement. In other federal states the various jurisdictions appear to work together. In the U.S., taxes paid to states and cities are deductible in computing federal tax.

SUMMARY OF CHIEF MINING TAX PROVISIONS IN 11 COUNTRIES

Country	Approximate total tax rates (combined central and local rates)	Treatment of exploration costs	Tax depreciation allowance	Tax free allowances (depletion credits, tax holidays, etc.)	Loss carry over position
Canada	37% income tax + mining tax (0% to 40% on mining income)	Deductible in year incurred	100% per annum	1) Earned depletion (one third exploration expenditures) 2) Investment credit 5-10%	Back 1 year Forward 5 years
U.S.	48% income tax + severance taxes in some states	do.	Diminishing balance ¹ or straight line	1) P.c. depletion. 5-20% of 50% of taxable income 2) Investment credit 10%	Back 3 years Forward 7 years
Ireland	50% income tax	120% of costs deductible when mine operating	100% per annum	1) Investment credit 20% of equipment expenditure 2) Exemptions for limited profit potential mines	Back 1 year Forward unlimited
Australia	42.5% income tax + state royalties (deductible)	Deductible in year incurred	Depreciable over 5 years	Investment credit 20% after July 1978; 40% before	Forward 7 years
New Zealand	30% or 45% income tax	Deductible as incurred (Incl. estimated expenditures in next 2 years)	100% per annum		Forward unlimited
South Africa	43% income tax	Deductible in year incurred	100% per annum		Forward unlimited
Brazil	30-35% income tax + 15% excise tax	Deductible over life of mine or 10 years	Straight line —equipment 10% per annum	1) Some export income tax free 2) Part of withholding tax may be used to pay income taxes 3) 25% of tax may be invested in undeveloped areas	Forward 3 years
Mexico	42% income tax + .9% to 6.6% production and export tax	Deductible as incurred if mine producing; otherwise over life of mine (Accelerated write-offs possible)	Equipment 10%	50-100% reduction in federal part of production and export taxes	Forward 5 years
Iran	38-68% income tax, graduated rates	Deductible over life of mine (max. 3 years)	Diminishing balance — equipment 35% per annum	5 year holiday (incl. withholding tax)	Forward 3 years (max. = one third of profits in current year)
Indonesia (3rd generation contracts)	35% income tax first 10 years; 45% thereafter. 10% royalty	Deductible over 8 years	Straight line over 8 years	Investment credit — 5% per annum for 4 years	Forward unlimited for losses in first 5 years
New Caledonia	50% income tax + 3 to 15% export tax	Deductible over life of concession	Equipment with over 3 year life-accelerated	Earned depletion (same as exploration expenditure) up to 15% of net income	Forward 5 years

Sources used include Coopers and Lybrand Mining Taxation 1977 (based mainly on mid-1976 survey).

A federal government and Mining Association of Canada task force study group co-chaired by the president of the Association and the Deputy Minister of EMR, has recently been established. There are several task force sub-committees, one of which is investigating financial/taxation matters related to the Canadian industry.

In addition, an effort must be made to co-ordinate provincial tax concessions so that one province's policies do not reduce activity in other provinces. An example of the latter is the tax regulations issued by Ontario in 1974 which provide incentives to encourage mineral processing in Northern Ontario. These were probably a decisive factor in Texasgulf's decision to build a new copper smelter and refinery at Timmins, Ontario. This smelter will aggravate the concentrate shortage at Quebec's Rouyn-Noranda smelter initially caused by declining copper mine production in Quebec.

Trade policy

Multilateral Trade Negotiations

In the context of the multilateral trade negotiations, efforts are being made to reduce barriers to international trade. The effects would begin to be felt in the medium term, i.e., in the early to mid-1980s, when implementation of any reductions would commence.

Largest Canadian mineral exports are ores, concentrates and primary metal where generally zero or low duties prevail. In this area, trade barriers tend to affect the profitability of Canadian operations more than the volume of trade although there can be important exceptions. For example, U.S. zinc producers have recently petitioned the U.S. International Trade Commission seeking restrictive quotas and increased duty rates on zinc imports on the grounds that imports damage the U.S. industry. (U.S. copper producers have made similar requests). Canada could be seriously hurt by the imposition of such restrictions and the government has conveyed its concern to the U.S. Government.

Compared to primary products, exports of semi-fabricated products are much lower and trade barriers generally much higher. The semi-fabricating industry is mainly geared to the requirements of Canada's small domestic market.

Because foreign trade barriers are one of the constraints to the achievement of increased exports of further processed nonferrous metals products, the trade negotiations are linked to the government's objective of further processing of resources prior to export. It is hoped that liberalization of trade can provide a basis for adjustment towards specialization and rationalization of production by broadening the readily available market and increasing competition. There are, however, other constraints to the attainment of this policy objective, most of which are referred to in previous sections of this profile. They include high capital and labour costs, small-scale operations, transport difficulties, competition policy and marketing policies of multinationals. In addition, some major companies operating in Canada (both Canadian and foreign owned) already have large semi-fabricating facilities in the northern U.S., the nearest export market to Canada. These constraints may hinder or frustrate efforts to achieve internationally competitive nonferrous metals processing in Canada.

Instability of prices

Because the supply of nonferrous metals is relatively inelastic (output from underground mines cannot be quickly increased) small changes in demand tend to produce substantial changes in prices. This is particularly true of copper.

The London Metal Exchange prices for copper have for many years been subject to considerable fluctuation (see Appendix B). They reflect marginal changes in world supply and demand.

The International Lead-Zinc Study Group, composed of governments of producing and consuming nations and advisers from industry, has been in existence for some years and has helped to reduce fluctuations in lead and zinc prices by developing reliable statistics that enable individuals to better forecast future market trends.

Producers and consumers, under the auspices of UNCTAD are seeking a means to stabilize commodity prices. One proposed method for copper is through an international commodity agreement, but it is unlikely that a technically sound and broadly acceptable agreement will prove to be negotiable in the near future. Canada is actively seeking a basis for co-operation with other countries, possibly along the line of the Lead-Zinc Study Group, in which the problems of statistics can be resolved and a basis for forecasting market trends established.

Environmental problems

Smelting and refining creates environmental problems. The main problem in the case of copper, lead, zinc and nickel is the disposal of the sulphur dioxide present in smelter gases. Sulphur dioxide is used to make sulphuric acid which can be used in fertilizers, but if a market is not available sulphur dioxide must be neutralized. The cost of neutralizing and collecting the sulphur dioxide generated in copper smelting is discussed on page 6. Environmental requirements are laid down by the provinces, and the federal Department of Fisheries and Environment provides guidelines.

As a general rule the level of environmental control in lead and zinc smelting operations is good and on a par with most other industrialized nations. It is less satisfactory in copper and nickel, with a 10 to 15 per cent level of control of sulphur dioxide emissions compared with 60 per cent in the U.S.

One of the factors inhibiting the construction of smelters is the cost penalty associated with environmental control if adequate markets for the by-product are not available. This is most immediate in British Columbia with respect to new copper smelters. Falconbridge is modernizing its smelter at Falconbridge, Ontario, which will include environmental safeguards. If Inco were to meet the requirements of 85 per cent control at Sudbury, it would be necessary to modernize the smelter (or build a new one) and include environmental safeguards. This would require substantial additional capital expenditures over a number of years.

If the authorities attempt to enforce full environmental controls on the Canadian copper and nickel industries too quickly, the cost burden may be such that some operations would have to be terminated or suspended.

Manpower problems

Many of the nonferrous industry's mines and smelters are located in remote areas. At present unemployment is high in Canada but when it is low and economic activity is high it is often difficult to attract labour, especially skilled labour, to remote areas.

Many of the mines and smelters are in single-industry communities (see Appendix D for details) which depend on the industry for virtually their entire livelihood. When mines become exhausted or close because the demand for metal falls, there is serious unemployment and an urgent need for joint action by industry and governments to help adjust to the new situation.

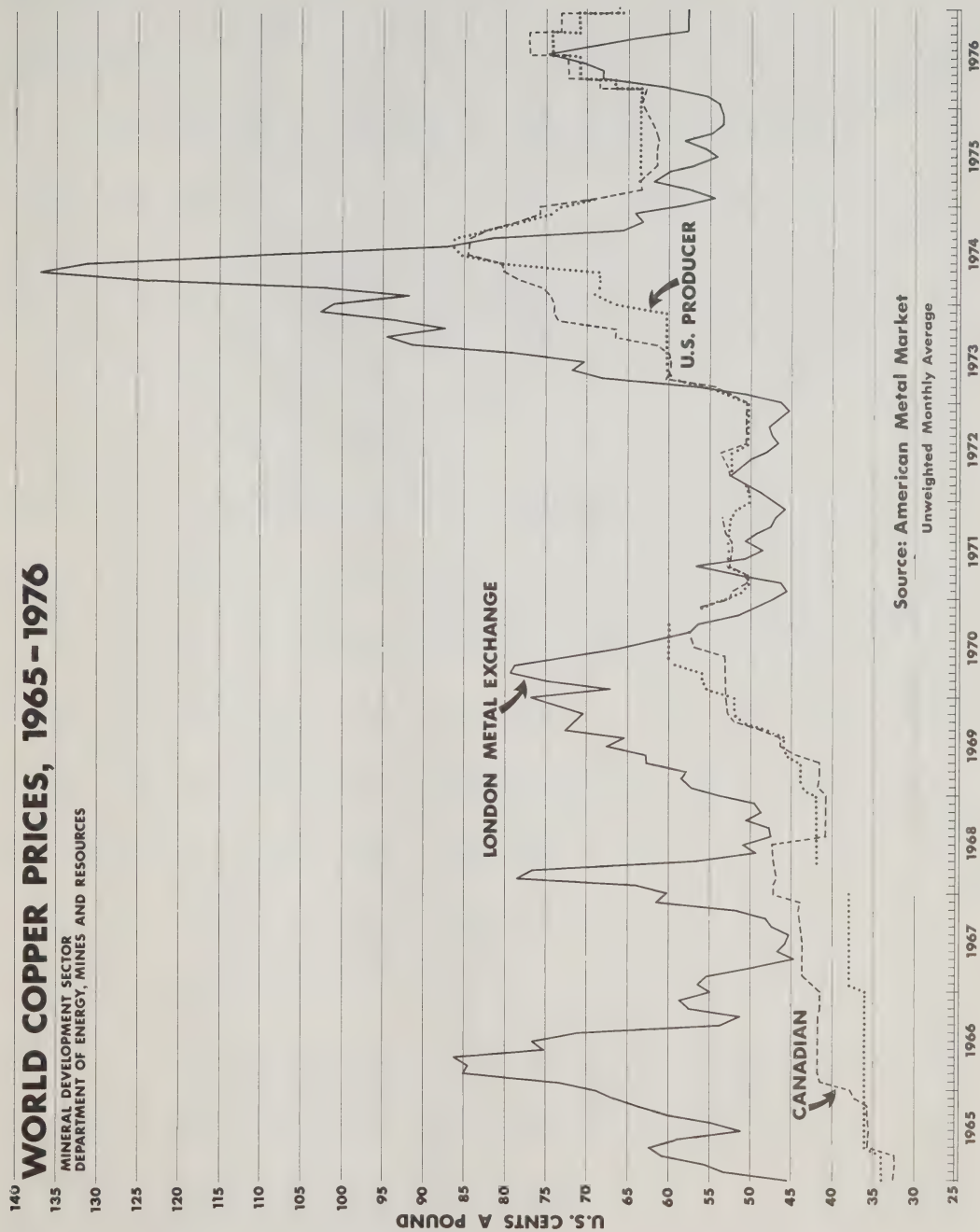
APPENDIX A
1975 selected principal statistics of the nonferrous industries

INDUSTRY	Employees		Salaries and Wages		Value Added Mining or Manufacture	
	Production	Total	Production	Total	Total	Total
	Number		Thousands of Dollars (\$'000)			
Total	73,685	102,067	924,302	1,384,473	3,125,114	3,182,997
Mining total	40,359	53,005	526,772	738,181	1,993,193	2,007,228
Mining, per cent of total	(54.8	51.9	57.0	53.3	63.8	63.1)
Copper - gold - silver mines	11,979	16,308	164,794	235,060	595,099	595,410
Nickel - copper mines	15,052	19,229	190,064	267,035	724,254	729,656
Silver - cobalt mines			Included with Silver - Lead - Zinc Mines			
Silver - lead - zinc mines	5,370	7,362	71,972	104,249	328,291	320,776
Molybdenum mines			Included with Misc. Metal Mines			
Gold quartz mines	4,841	5,798	57,883	72,094	149,486	149,869
Misc. metal mines n.e.s.	3,717	4,308	42,059	59,743	196,063	211,517
Smelting and Refining Total	22,932	35,577	287,743	491,840	844,537	886,405
Smelting and refining, per cent of total	(31.1	34.9	31.1	35.5	27.0	27.8)
Rolling, Casting and Extruding Total	10,394	13,485	109,787	154,452	287,384	289,364
Rolling, casting and extruding, per cent of total	(14.1	13.2	11.9	11.2	9.2	9.1)
Copper and copper alloy rolling, casting and extruding	2,639	3,240	30,016	38,733	68,761	68,282
Aluminum, rolling, casting and extruding	4,196	5,672	46,962	69,309	132,801	132,636
Metal, rolling, casting and extruding n.e.s.	3,559	4,573	32,809	46,410	85,822	88,446

Source: S. C. Industry Annuals.

WORLD COPPER PRICES, 1965-1976

MINERAL DEVELOPMENT SECTOR
DEPARTMENT OF ENERGY, MINES AND RESOURCES



Source: American Metal Market
Unweighted Monthly Average

APPENDIX C
NON-FERROUS METALS, CANADA AND WORLD
MINE PRODUCTION AND EXPORT TRADE, 1962 - 1976
(thousands of metric tons)

	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
ALUMINUM															
Production (primary)															
World	4,998.5	5,400.8	6,054.9	6,586.1	7,208.7	7,933.1	8,515.0	9,459.3	10,257.0	10,936.0	11,649.0	12,707.3	13,810.1	12,693.2	9,536.4
Canada	626.1	652.5	764.4	753.4	807.3	873.9	888.3	978.6	962.5	1,002.1	907.1	930.0	1,006.8	880.1	508.0
Canada - %	12.5	12.1	12.6	11.4	11.2	11.0	10.4	10.3	9.4	9.2	7.8	7.3	7.3	6.9	5.3
Canada - rank	3	3	3	3	3	3	3	3	3	3	4	4	4	4	5
Exports (unwrought)															
World			1,478.3a	1,621.3a	1,682.7a	1,928.0	2,349.4	2,639.8	2,315.4	2,176.3	3,019.1	3,382.0	3,580.7	3,156.2	
Canada			572.1	644.6	652.7	690.0	782.6	804.4	761.7	806.4	698.7	698.5	681.5	509.2	507.5
Canada - %			38.7	39.7	38.8	35.8	33.3	30.5	32.9	37.0	23.1	20.6	19.0	16.1	...
COPPER															
Mine Production															
World	4,534.3	4,624.3	4,847.4	4,962.7	5,215.7	5,056.6	5,455.9	5,941.8	6,383.9	6,458.7	7,041.9	7,509.4	7,653.1	7,298.0	7,930.6
Canada	414.9	410.8	441.7	460.7	459.1	556.4	574.5	520.0	610.3	654.5	719.7	823.9	821.4	712.9	723.6
Canada - %	9.1	8.9	9.1	9.3	8.8	11.0	10.5	8.7	9.5	10.1	10.2	11.0	10.7	9.8	9.1
Canada - rank	5	5	5	5	5	5	5	5	5	5	3	3	4	4	3
Exports (ores)															
World			265.3	242.7	265.1	342.8	443.7	430.7	534.7	622.5	829.7	1,110.4	1,230.1	1,052.1	1,105.2
Canada			94.8	78.9	86.1	117.0	146.8	143.2	162.5	204.1	270.3	346.4	343.8	314.6	308.9
Canada - %			35.7	32.5	32.5	34.1	33.1	33.2	30.4	32.8	32.6	31.2	27.9	29.9	27.9
Exports (refined)															
World			1,840.2	1,908.6	2,013.0	2,113.5	2,285.1	2,255.2	2,348.1	2,300.4	2,400.9	2,493.0	2,788.8	2,494.5	2,555.6
Canada			203.5	181.3	173.0	250.3	250.9	190.5	265.3	285.1	293.4	290.0	282.8	319.6	313.2
Canada - %			11.0	9.5	8.6	11.8	11.0	8.4	11.3	12.4	12.2	11.8	10.1	12.8	12.2
GOLD															
Mine Production															
World	1.6	1.4	1.5	1.7	1.7	1.7	1.7	1.7	1.7	1.6	1.6	1.5	1.4	1.4	1.4
Canada	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Canada - %	8.4	9.0	8.3	6.6	6.1	5.8	5.2	4.8	4.4	4.3	4.1	4.0	3.7	3.7	3.6
Canada - rank	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Exports (bullion)															
World a,b								0.6	0.9	0.9	0.7	0.7	0.8		
Canada								0.1	0.2	0.1	0.1	0.05	0.04		0.06
Canada - %								23.8	30.7	13.5	16.6	6.7	5.0		...
LEAD															
Mine Production															
World	2,509.8	2,546.8	2,575.8	2,741.0	2,899.6	2,901.9	3,003.4	3,263.5	3,421.4	3,437.3	3,499.8	3,579.3	3,566.2	3,556.1	3,495.5
Canada	195.3	182.5	184.8	264.7	272.7	288.5	308.6	289.1	353.1	367.9	335.1	342.0	294.3	335.6	247.1
Canada - %	7.8	7.2	7.2	9.6	9.4	9.9	10.3	8.8	10.3	10.7	9.6	9.5	8.2	9.4	7.1
Canada - rank	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4
Exports (refined)															
World	907.9	806.3	971.8	923.4	889.1	939.6	935.6	898.2	963.4	937.1	910.4	942.4	990.9		
Canada	114.6	88.5	87.0	117.1	96.6	120.0	125.9	97.1	138.6	124.2	127.8	113.6	71.7	109.9	114.4
Canada - %	12.6	11.0	9.0	12.7	10.9	12.8	13.4	10.8	14.4	13.2	14.0	12.0	7.2
MOLYBDENUM															
Mine Production															
World b	34.1	41.6	42.9	52.1	63.6	57.4	58.3	64.6	73.6	77.6	81.3	83.7	86.1	78.4	73.5
Canada	0.4	0.4	0.6	4.3	9.3	9.6	10.2	13.5	15.3	10.3	12.9	13.8	14.0	12.5	14.4
Canada - %	1.1	0.9	1.1	8.3	14.6	16.8	17.5	20.8	20.8	13.3	15.0	15.9	16.2	15.9	19.6
Canada - rank	6	6	4	3	2	2	2	2	2	2	2	2	2	2	2
Exports (ores)															
World c						30.2	28.2	42.9	45.4	38.6	41.5	51.4	58.6	54.2	54.2
Canada d						10.8	10.3	11.7	13.8	10.4	14.2	11.3	12.4	15.7	14.6
Canada - %						35.7	36.5	27.2	30.3	26.9	34.2	22.0	21.1	29.0	26.9
NICKEL															
Mine Production															
World	369.8	365.7	395.7	437.1	415.8	478.5	545.1	514.2	665.6	680.6	624.9	674.9	737.6	732.9	720.1
Canada	215.0	196.9	207.3	235.1	202.9	225.6	239.8	193.8	277.5	287.0	234.9	249.0	269.1	242.7	238.9
Canada - %	58.1	53.8	52.4	53.8	48.8	47.1	44.0	37.7	41.7	39.2	37.6	36.9	36.5	33.1	33.2
Canada - rank	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Exports (refined) e															
World	128.8		166.0	164.5	160.4	151.6	135.6	211.3	196.9	199.0	198.0	216.9			
Canada			122.6	120.4	115.7	115.3	94.6	139.0	113.8	109.7	120.6	119.4	90.7		87.9
Canada - %			73.8	73.2	72.7	76.0	69.8	65.8	57.8	55.1	60.9	55.0
SILVER															
Mine Production															
World	7.6	7.9	7.8	8.0	8.5	8.0	8.5	9.2	9.6	9.3	9.4	9.7	9.4	9.4	9.4
Canada	0.9	0.9	0.9	1.0	1.0	1.1	1.4	1.4	1.4	1.4	1.4	1.5	1.3	1.2	1.3
Canada - %	12.6	11.7	11.9	12.5	12.3	14.2	16.4	15.4	14.4	15.4	14.8	15.3	14.2	13.2	13.5
Canada - rank	4	5	5	5	5	3	1	1	1	1	2	2	2	2	2
Exports (bullion)															
World a,b	5.7			5.3		10.9				4.8	12.4	9.2	6.9		
Canada	0.6			0.4		0.9				0.6	0.6	0.7	0.7	0.7	0.9
Canada - %	10.4			6.8		8.2				12.2	5.1	8.0	10.0
ZINC															
Mine Production															
World	3,523.8	3,606.1	3,971.5	4,273.6	4,470.3	4,785.7	4,976.3	5,337.2	5,464.9	5,513.5	5,675.3	5,898.8	5,909.3	5,892.4	5,503.1
Canada	420.2	429.8	621.0	745.7	874.6	1,008.3	1,051.8	1,095.5	1,135.7	1,133.7	1,128.7	1,226.6	1,127.0	1,052.1	1,159.3
Canada - %	11.9	11.9	15.6	17.4	19.6	21.1	21.1	20.5	20.8	20.6	19.9	20.8	19.1	17.8	21.1
Canada - rank	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1
Exports (slab)															
World	845.7	843.4	904.1	1,073.8	1,061.1	1,103.6	1,248.1	1,264.2	1,291.5	1,334.0	1,687.4	1,680.3	1,600.1		
Canada	191.2	181.4	216.0	239.7	232.4	270.0	289.1	278.9	318.8	283.2	370.4	420.7	295.4	247.2	350.5
Canada - %	22.6	21.5	23.9	22.3	21.9	24.5	23.2	22.1	24.7	21.2	21.9	25.0	18.5

Not available

a Major exporting countries only

b Western world

APPENDIX D

Some single-industry communities which rely on nonferrous mining, smelting and refining

Newfoundland

Daniel's Harbour	Newfoundland Zinc Mines Ltd. (Teck) Zinc
Baie Verte	Consolidated Rambler Mines Ltd. Copper, gold, silver
Buchans	Asarco Inc. Zinc, lead, copper, silver, gold, cadmium

New Brunswick

Bathurst	Nigadoo River Mines Ltd. Lead, zinc, copper, silver Brunswick Mining and Smelting Corp. Ltd. (Noranda) Zinc, lead, copper, silver, bismuth
Belledune	Brunswick Mining and Smelting Corp. Ltd. (Noranda) Smelter — lead, silver, bismuth
Newcastle	Heath Steele Mines Ltd. Zinc, lead, copper, silver, gold

Quebec

Murdochville	Gaspé Copper Mines Ltd. (Noranda) Copper, molybdenum, silver, selenium, tellurium, bismuth. Smelter — copper
Chibougamou	Patino Mines (Quebec) Ltd. Copper, gold, silver Campbell Chibougamou Mines Ltd. Copper, gold, silver
Chapais	Falconbridge Copper Ltd. Copper, gold, silver
Mattagami	Mattagami Lake Mines Ltd. (Noranda) Zinc, copper, silver, gold Orchan Mines Ltd. Zinc, copper, silver, gold
Malartic	Camflo Mines Ltd. Gold East Malartic Mines Ltd. Gold
Val d'Or	Lamaque Mining Co. Ltd. (Teck) Gold Sigma Mines (Quebec) Ltd. Gold Manitou-Barvue Mines Ltd. Zinc, copper, lead, silver, gold
Louvicourt	Louvem Mining Co. Inc. Copper, zinc
Noranda	Falconbridge Copper Ltd. Copper, zinc, silver, gold Noranda Mines Ltd. (Horne Mine) Copper, gold, silver, selenium, tellurium, pyrite. Smelter — copper

Ontario

Haley	Chromasco Ltd. Smelter — magnesium, calcium
Copper Cliff	Inco Ltd. Nickel, copper, gold, silver, platinum, cobalt, selenium, tellurium. Smelter and refinery — nickel, copper, gold, silver, platinum, selenium, tellurium
Falconbridge	Falconbridge Nickel Mines Ltd. Nickel, copper, platinum, cobalt. Smelter — copper-nickel matte
Timmins	Texasgulf Canada Ltd. Zinc, copper, lead, silver, cadmium, tin. Smelter and refinery — zinc, cadmium Dome Mines Ltd. Gold
South Porcupine	Pamour Porcupine Mines Ltd. (Noranda) Copper, gold
Schumacher	Pamour Porcupine Mines Ltd. (Noranda) Gold
Pamour	Upper Canada Resources Ltd. Gold, silver (also iron)
Kirkland Lake	Kanichee Mining Inc. Nickel, copper (also iron)
Temagami	Noranda Mines Ltd. Copper, zinc, silver, lead
Manitouwadge	Willroy Mines Ltd. Zinc, copper, silver, lead Mattabi Mines Ltd. Zinc, copper, silver, lead, gold
Sturgeon Lake	Falconbridge Copper Ltd. Zinc, copper, lead, silver, gold
Balmertown	Campbell Red Lake Mines Ltd. Gold Dickenson Mines Ltd. Gold
Madsen	Bulora Corp. Ltd. Gold
Uchi Lake	Selco Mining Corporation Ltd. Copper, zinc, silver

Manitoba

Flin Flon	Hudson Bay Mining and Smelting Co. Ltd. Copper, zinc, gold, silver, cadmium, selenium, tellurium. Smelter and refinery — copper, zinc, cadmium
Snow Lake	Hudson Bay Mining and Smelting Co. Ltd. Copper, zinc, lead, silver, gold
Wabowden	Falconbridge Nickel Mines Ltd. Nickel, copper
Thompson	Inco Ltd. Nickel, copper, precious metal residue. Smelter and refinery — nickel, precious metal residue, cobalt oxide
Lynn Lake	Sherritt Gordon Mines Ltd. Nickel, copper, cobalt
Fox Lake	Sherritt Gordon Mines Ltd. Copper, zinc, silver
Ruttan Lake	Sherritt Gordon Mines Ltd. Copper, zinc

ENVIRONMENTAL ISSUESISSUE

How to provide the necessary degree of environmental protection to the natural environment without impairing the economic health and growth of the non-ferrous metals industry.

BACKGROUND

The past decade has witnessed a growing concern for the physical environment which has resulted in extensive legislation and regulation regarding emissions to the environment. The laws and regulations were narrowly focused on the physical environment, required rather extreme measures, and were to be administered by specialists in the physical environment. However, the cost of compliance for the non-ferrous metals industry is so large that the effects of these laws and regulations far transcend the physical environment. Yet there is no mechanism for balancing such often conflicting interests as employment, occupational health, regional development, ability to compete in world markets, balance of payments, the physical environment and public health. Some regulators have recognized the dilemma but the only discretion allowed them is to decide whether or not to enforce the regulations.

Of course, the problem of divided jurisdiction exists in the environmental area too. Provincial and federal authorities both operate broadly as described above but with different timing and with different quantitative standards of performance.

RECOMMENDATIONS

The existing framework of laws and regulations should be revised or replaced by the following.

1. The federal authorities should set minimum standards for environmental quality to be enforced by the provinces.

These standards should be used only for ruling out the grossest kinds of environmental abuse; e.g. large-scale, irreversible destruction of the natural environment or the emission of life-threatening quantities of hazardous pollutants. As environmental changes become less severe, the use of quantitative standards in a go no-go manner becomes increasingly less realistic and a balance of affected interests should be made.

2. The federal authorities should take the lead in research into environmental matters. This would include developing improved analytical techniques, control technology and, most important, methods for assessing actual risks to people and the environment.
 - a. The evaluation of possible health hazards resulting from emitted pollutants must consider not only the toxicity of the substance involved but also the amount emitted, the form in which it is emitted, its persistence in the environment, the possibility of significant human exposure and the number of people involved. Such an effort would be multi-disciplinary and would involve at least toxicology, epidemiology, biology, meteorology, chemistry and engineering.
 - b. A similar effort is needed to assess meaningful effects on aquatic and terrestrial flora and fauna.
3. The federal and provincial authorities should jointly establish a mechanism for evaluating and comparing costs and benefits resulting from activities of the non-ferrous metals industry. The provinces would conduct the evaluation and, based on the results, give specific directions to the company or industry involved.

The Social Economic Impact Assessment approach currently being experimented with by the federal government is a recognition that the side effects of regulatory actions must also be evaluated. However, SEIA is being applied to broad regulations whereas the non-ferrous metals industry would like site-specific evaluations that provide opportunity for an important input from the people most directly affected.

PROPOSALS TO IMPROVE
THE CANADIAN CLIMATE
FOR RESEARCH AND DEVELOPMENT

CONSIDERATIONS

The recent history of Canadian R&D performance has been well documented and has become a matter of growing concern in many quarters. Not only has Canada's level of total R&D expenditures declined in relation to Canada's Gross National Product, but in constant dollars - that is, after adjustment for inflation - it has only increased negligibly over the last decade, and not at all in the 1970's. In contrast, real R&D performance in other leading industrial nations has not only been relatively higher, but, in many cases, rising - both in constant dollar terms and in relation to GNP. According to the most recent available estimates, Canada's R&D spending, as a proportion of GNP, currently ranks 14th among OECD countries - for example, considerably below the United States, West Germany and Japan (see appended chart 1) and only marginally ahead of Greece and Turkey.¹

Much of the growing concern in Canada has focused on the overall weakness of R&D activities within Canadian industries, as measured both by the number of qualified R&D manpower and by the real level of R&D expenditures. In relative terms, industry's share of R&D manpower is significantly lower in Canada than it is in many other industrialized countries. For example, in 1971 Canada had less than 40 per cent of total R&D manpower employed in the business sector in contrast to figures more than 60 per cent in Germany, Japan and Sweden. Moreover, in terms of employment in R&D in the business sector, Canadian industry in 1975 was proportionately in the range of only one-half to one-third of that in other leading industrial nations. In terms of the proportion of R&D expenditures vis-à-vis real output, Canada was equivalently below most other leading industrial countries in 1975. (See appended charts 2,3 and 4.) At the same time, R&D expenditures in Canada by governments was about one-third of total R&D expenditures, compared with only about one-sixth in such countries as the United States and Germany.

Compared with other Canadian industries, the mining industry in Canada has maintained a significantly higher ratio of R&D expenditures to total output, (see appended chart 5) but this ratio has dropped significantly in the 1970's. In fact, for Canadian industry as a whole, this ratio has declined by close to one-fifth since the mid-1960's. This is obviously a performance that is not adequate by world standards. It must be emphasized that the unsatisfactory and deteriorating Canadian R&D performance which has been in existence for a decade, is not the result of business cycle forces, although cyclical factors may have accentuated the problem in the mid-1970's. The problems are more fundamental and serious. We believe that a new strategic approach is needed by governments to strengthen the basis for, and commitment to, industrial R&D. Specifically, any plans to improve this situation should be designed, initially, to halt the overall decline in Canadian R&D activities, both by moderating or halting the declines taking place in some industries and organizations and by encouraging expanding or new activities in others. In the medium and longer term, strong measures are needed to promote and ensure significant overall growth.

Canada traditionally has spent proportionately far more on pure research which at best is of longer-term consequence. Moreover, we have encountered difficulties in moving relevant government research into commercial development. Yet it is the application of new technology, and the introduction of new innovations, that are of ultimate importance in fostering industrial progress, especially in the high technology industries that have constituted the critical "leading edge" to progress during recent decades. This cannot be achieved, however, without the innovative thrust provided by a strong and well-directed R&D capability operating from within industry. This capacity must work in close collaboration with those actively engaged in production and marketing to sharpen the selection of R&D programs and to ensure that full commercial advantage is taken of those R&D programs which are completed successfully. A critical factor here is that the absorption of new technology is retarded by the lack of sufficient qualified technical people in small Canadian businesses to recognize and take advantage of the opportunities provided by new developments.

RECOMMENDATIONS

No single policy or program will adequately serve to achieve the objectives outlined above. What is needed is an integrated package of tax and other policy incentives. In this context, the following proposals are set forth. An essential feature is that each incentive be left unchanged at least for a decade, so that long-range planning of effective industrial R&D may be undertaken. Frequent alterations or abrupt cutoffs preclude the requisite certainty in planning. To be effective, five specific elements must be included in the proposed package.

1. The Government of Canada should continue to encourage government departments and agencies to have their industrially related research done by the private sector whenever this is feasible - that is, expand substantially on what was achieved under the "contracting out" policy followed since 1972. A very major further initiative - many times the current levels - is essential in this area to assist in establishing levels of R&D in Canadian industry that are commensurate with those in other leading industrial nations.

This implies some difficult, but undoubtedly necessary, withdrawal of support for duplicative or inappropriate intramural government R&D activities in all levels of government and institutions supported by government funds, a corresponding shift of activities to the industrial sector and expanded support of private sector endeavours. "Contracting out" may well be of critical importance in the immediate future in avoiding the dispersal of capable industrially oriented research teams currently lacking adequate financial sponsorship to maintain their capability. If permitted to lapse below the critical size for effective operation such teams cannot readily be reassembled.

The term "critical size" is difficult to define, and will obviously vary from situation to situation. Perhaps it can be best described as a team a) comprising of an appropriate range of expertise and essential supporting services, b) with a solid and continuing core group of knowledgeable and experienced research people, and c) with a group of creative individuals to provide synergistic direction of R&D efforts. Together these are needed to provide the base for performing at least three important functions:

- a) undertaking planned and assigned tasks;
- b) perceiving and exploiting breakthroughs emerging from these R&D activities; and
- c) operating in an innovative and creative fashion to pursue changing and evolving activities.

2. Additional grants should be made available to industry for special R&D projects that, in the view of the Government of Canada, while not directly applicable to rapid industrial development, are of long-term public interest. These may also be of immediate value in reducing the cutback of existing research teams, but the grants should, nevertheless, be made available as required over at least the next ten years.

3. A basic and generous tax credit for R&D capital and operating expenditures incurred by industry must be the keystone of any successful incentive program. This incentive should take the form of a credit against tax payable for all "allowable" expenditures in Canada as appropriately defined;¹ unused tax credits in years of low earnings or losses should be allowed to be carried forward; and the incentive should be available for a minimum period of ten years. The minimum level of any such tax credit should be 15 per cent, and perhaps as high as 25 per cent in regions designated under the Regional Development Incentives Act.

4. In addition to the tax credit incentive proposed above, there should be a grant equal to some specific percentage of the value of each capital expenditure on new research facilities constructed or installed within an initial ten-year period. While these would not be eligible for federal investment tax credits, they would be eligible under the present capital cost allowance deduction provisions of the Federal Income Tax Act.

5. To assist in the effective use of new and of skilled professional and technical R&D manpower, in addition to the tax credit incentives and in addition to the recently announced program to create new R&D jobs under the Industrial Research Assistance Program of the National Research Council, there should be three different sets of federal grants to allow:

- a. students in professional and highly skilled technical courses to be recruited to industrial R&D installations for a period of one or more years;

1 - The appropriate definition of allowable expenditures is deemed that used by IRDIA.

- b. graduate Canadian students from universities here or abroad to be hired for a period of up to three years;
- c. other "qualified" scientific personnel to be hired provided such hiring increases the existing complement of R&D personnel at that location.

To be effective, manpower grants for students should cover the entire cost of up to one year of practical experience in industrial research under a "commitment of intention" to return to complete their academic studies, possibly with academic credits awarded for the experience. The government grants for Canadian graduates should cover, say 50 per cent of their compensation. This would assist them in gaining practical experience, provide the opportunity for management to assess their capabilities for effective careers in industrial research, and help to bridge the difficult gap between the academic world and industry. Grants for more senior and qualified R&D manpower should cover, say 25 per cent of their compensation so that industry can attract and retain in Canada able and experienced E&D manpower and minimize the danger of a deleterious "brain drain" to other countries. More important, small companies, with the aid of these manpower grants, together with other relevant incentives in the "package", would be encouraged to hire qualified professional people or to increase their small technical staffs and thus facilitate the transfer from laboratories to industrial applications.

In addition to covering the compensation (including all fringe benefits) in the above manpower grants, an approximately equivalent grant to cover related overhead costs should also be available. Moreover, as already mentioned above, this whole "manpower grant" program for R&D should remain in place for at least ten years.

An appropriate federal-provincial government "mix" of the above proposals should be a matter for serious discussion and debate, but all five appear essential to achieve basic and fundamental success. For example, one might argue that the total capital cost credits from proposals 2 and 3 should be at least equivalent to 40 per cent of the capital of each new R&D investment. Similarly, the total incentive under 3 and 5 must be powerful if it is to have a significant effect on the reallocation and increase of R&D manpower within the business sector.

Finally, the conditions under which any R&D tax incentives are made available must recognize that the commercial exploitation of Canadian technology to the overall national benefit implies the potential for generating returns from the export of such technology, together with requisite consulting and other services, as well as from the export of Canadian goods embodying the new technology. Evolutionary developments of this type can, in the long run, aid in realizing Canada's full potential in a world in which the export of services is rising progressively relative to the export of goods.

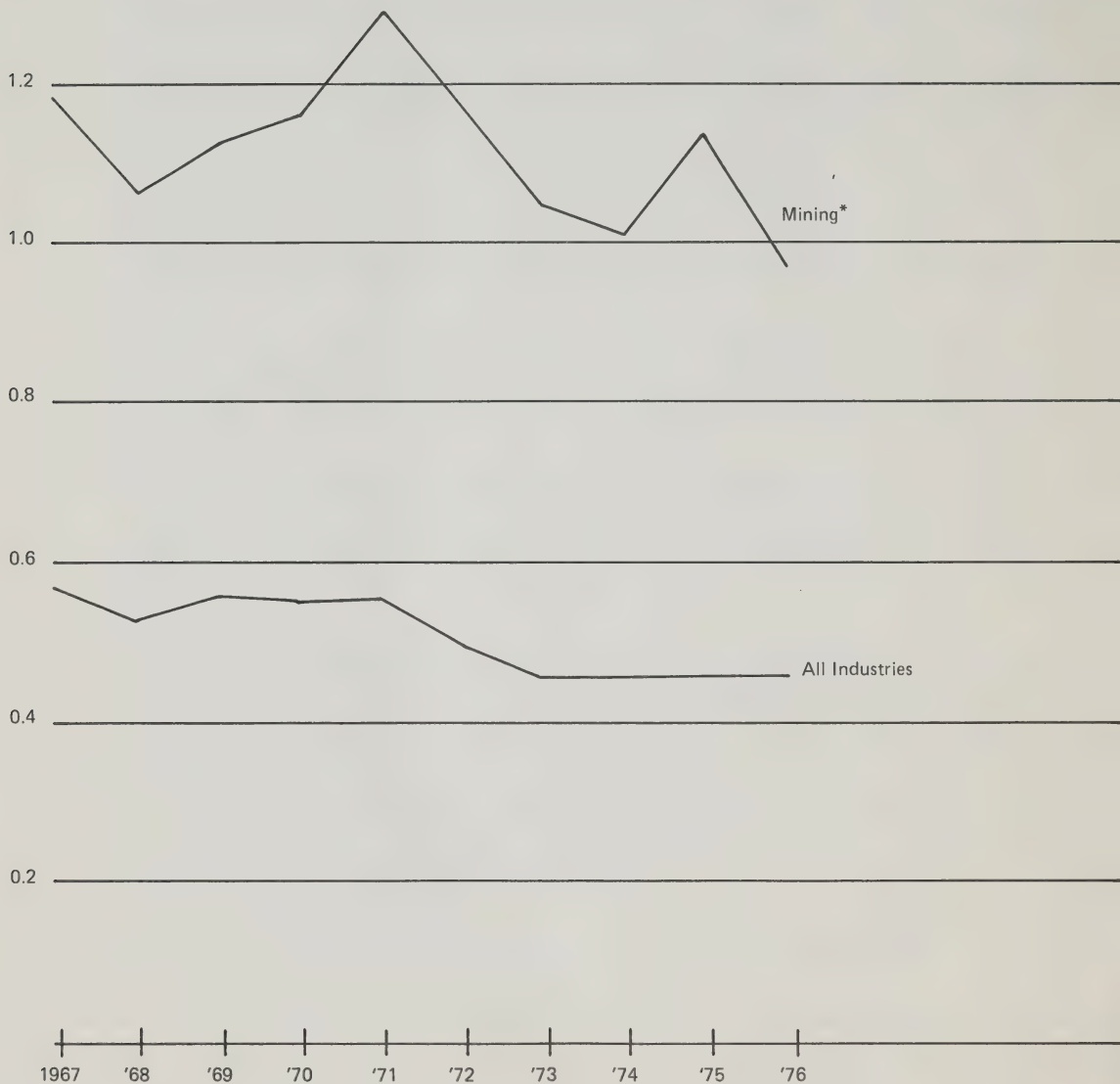
IMPACT

These proposals should receive government's serious consideration and be implemented as early as possible. It is imperative that we adopt policy initiatives to halt the decline in Canadian industrial R&D expenditures and develop a basic strategy to foster its long-term expansion. If we achieve this, we will be contributing significantly to the improvement of Canada's position in the increasingly competitive international environment.

Technological advances have increasingly come to be a key element in countries where industries are on the frontiers of modern, efficient, and competitive industrial advances. Changing cost and competitive structures are posing a greater, not a declining, need for strengthening R&D efforts and the application of the results of these efforts, with respect to both new process and new product development. Perhaps nowhere is this more important in a country such as Canada which is urgently seeking to strengthen its international capabilities and competitiveness in manufacturing.

INDUSTRIAL R & D BY CANADIAN FIRMS IN CANADA AS A SHARE OF TOTAL OUTPUT

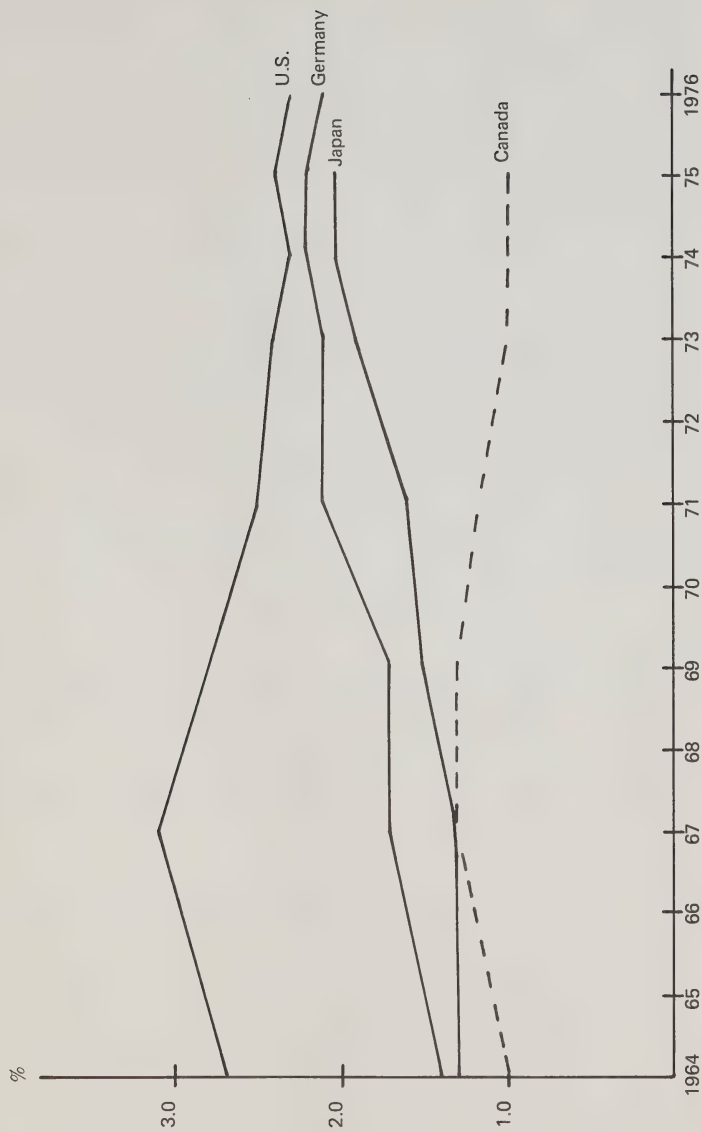
Mining Industry & All Industries



*Mines & Metal Industries (non-energy); subject to revision

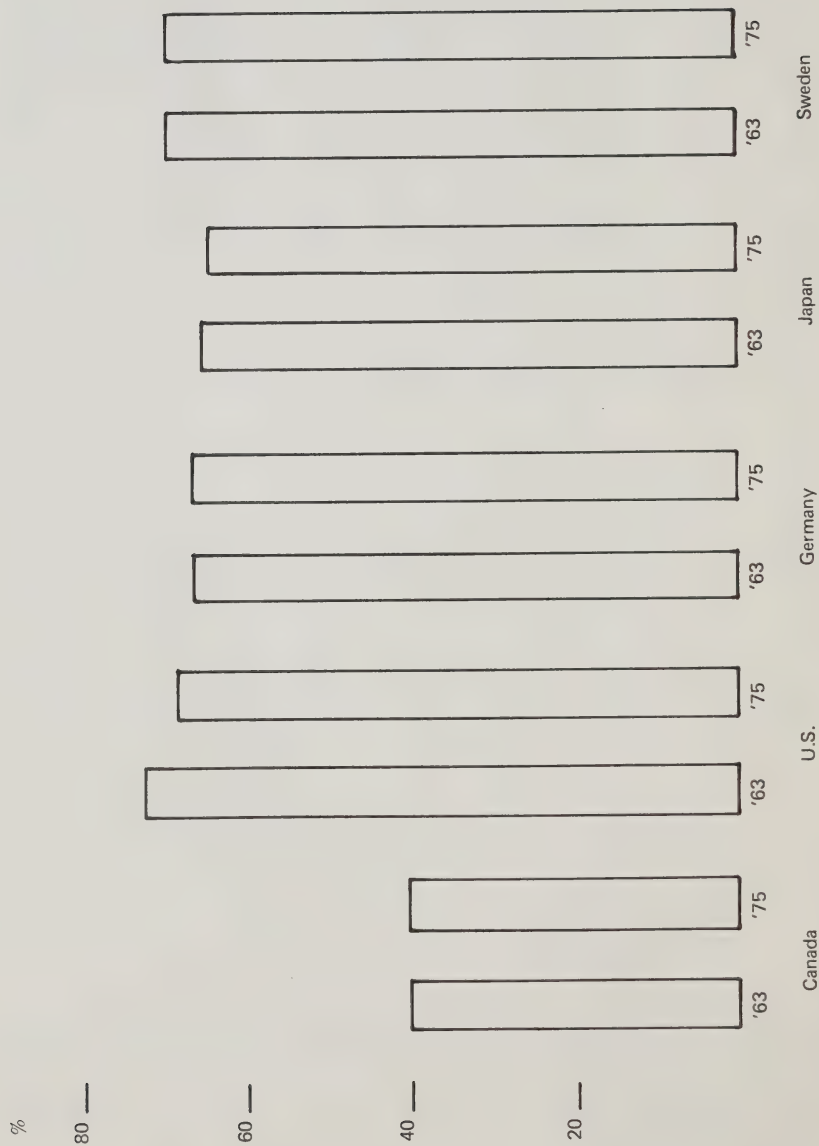
Source: Statistics Canada

TOTAL R & D EXPENDITURES AS A SHARE OF NATIONAL OUTPUT



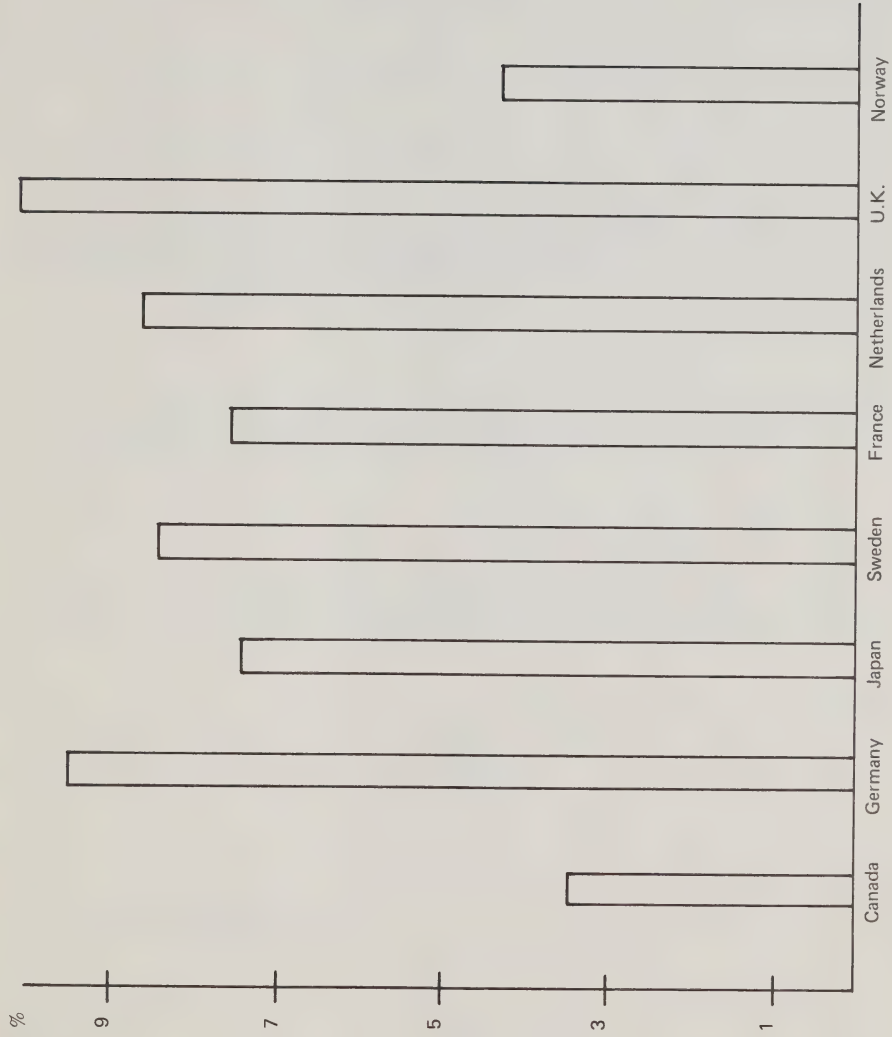
Source: OECD and subject to revision

SHARE OF TOTAL R & D PERFORMED IN BUSINESS ENTERPRISE SECTOR, 1963 & 1975



Source: OECD and subject to revision.

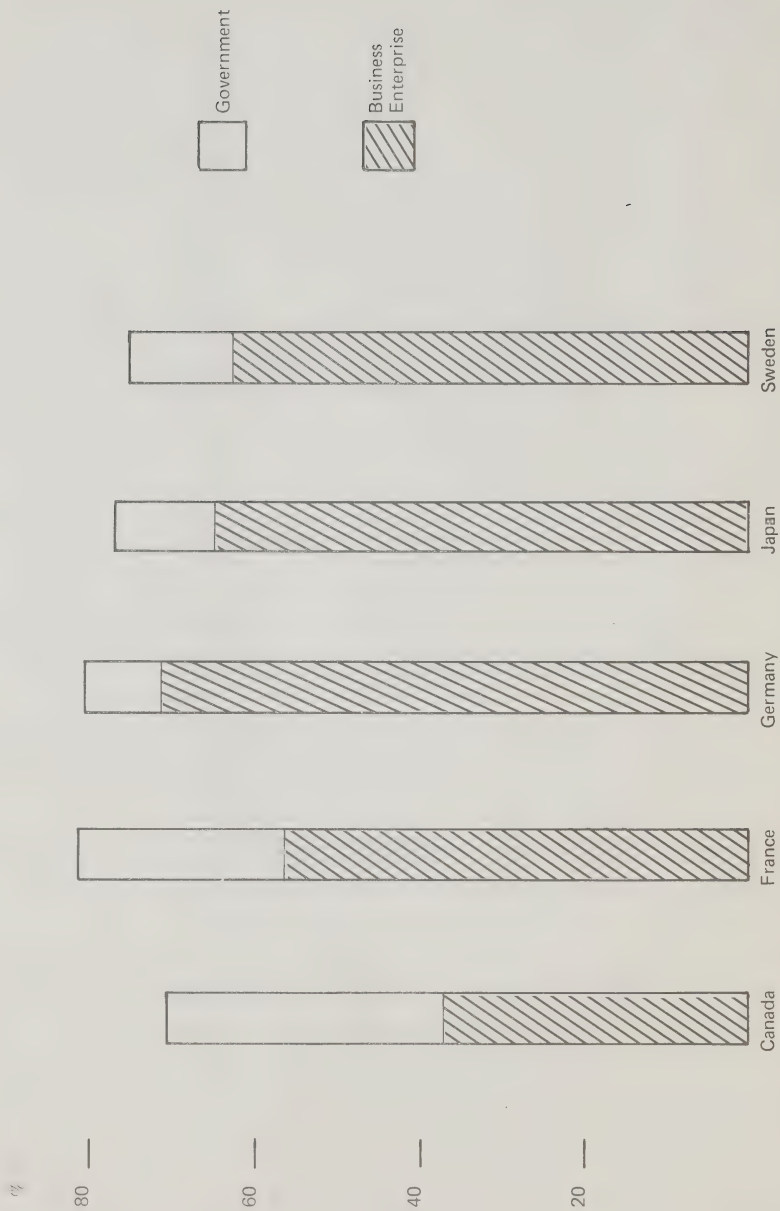
BUSINESS ENTERPRISE SECTOR: EMPLOYMENT IN R & D AS SHARE OF TOTAL EMPLOYMENT*, 1975



* All Industries

Source: Statistics Canada

SHARE OF TOTAL R & D MANPOWER EMPLOYED IN THE BUSINESS ENTERPRISE SECTOR & IN GOVERNMENT, 1971



Note: excludes private non-profit and higher education sectors

Source: OECD

July 6, 1978

A P P E N D I X VIII

Mr. Alfred Powis
President & Chief Executive Officer
Noranda Mines Limited
P.O. Box 45, Commerce Court West
Toronto, Ontario M5L 1B6

Re: Task Force - Non-Ferrous Metals

Dear Mr. Powis:

It is with regret that I must disassociate myself from the Report of the Consultative Task Force on the Non-Ferrous Metals Industry.

I am taking this action because the report seems to me to be not only a self-serving but selfish document which attempts to take advantage of the current world economic climate to gain special permanent concessions for a vested interest group in Canada.

I agreed to participate in this task force to begin with because of my conviction that there are specific and unique problems faced by this important Canadian industry. I believe then and I continue to believe that the sincere joint efforts of industry, labour and both levels of government can contribute materially to the resolution of these questions in which we have a common interest.

I refer for example to:

- The urgent need to resolve federal-provincial jurisdictional wrangles over the taxation of mining companies so that a dependable and stable tax environment is established.
- The adoption of a national transportation policy which will lend itself to the most efficient use of our transportation systems in the interests of Canadian industrial strategy.
- A stronger government role in the fields of research and development, and the implementation of new technologies as they relate to this and other industries.
- A unified approach by governments, industry and labour to the problems of resource-based communities in remote regions of the country.
- The effects of foreign ownership on the nature and structure of our industrial development.

Although reference is made to most of these questions in the task force report, the main focus is on proposals for special tax and other concessions to the industries which in my view are not justified by the objective circumstances.

Even if I have to take such a position, I am convinced that dialogue is necessary and hopefully in the long run useful. In order to achieve more positive objectives there are prerequisites:

- 1) Labour should be considered equal partners in setting up the terms of reference of any consultative operation.
- 2) Labour participants should be consulted as far as time and places for meetings.
- 3) And most important, the time frame should be such that it allows us to carry out the necessary research and studies in order to have a real input in the rounds of discussion.

In addition to my remarks you will find enclosed the position of the Canadian Labour Congress which is also that of our Union.

c.c. Mr. Dennis McDermott
F.S. Cooke
J. Gérin-Lajoie
L. Stevens

Yours truly,



E. Gérard Docquier
National Director

ADDITIONAL COPIES AVAILABLE FROM:
OFFICE OF INFORMATION AND PUBLIC RELATIONS
PRINTING AND DISTRIBUTION UNIT (2E)
DEPARTMENT OF INDUSTRY TRADE AND COMMERCE
OTTAWA, CANADA, K1A 0H5

AUSSI PUBLIÉ EN FRANCAIS